MARCH 1957

GAS

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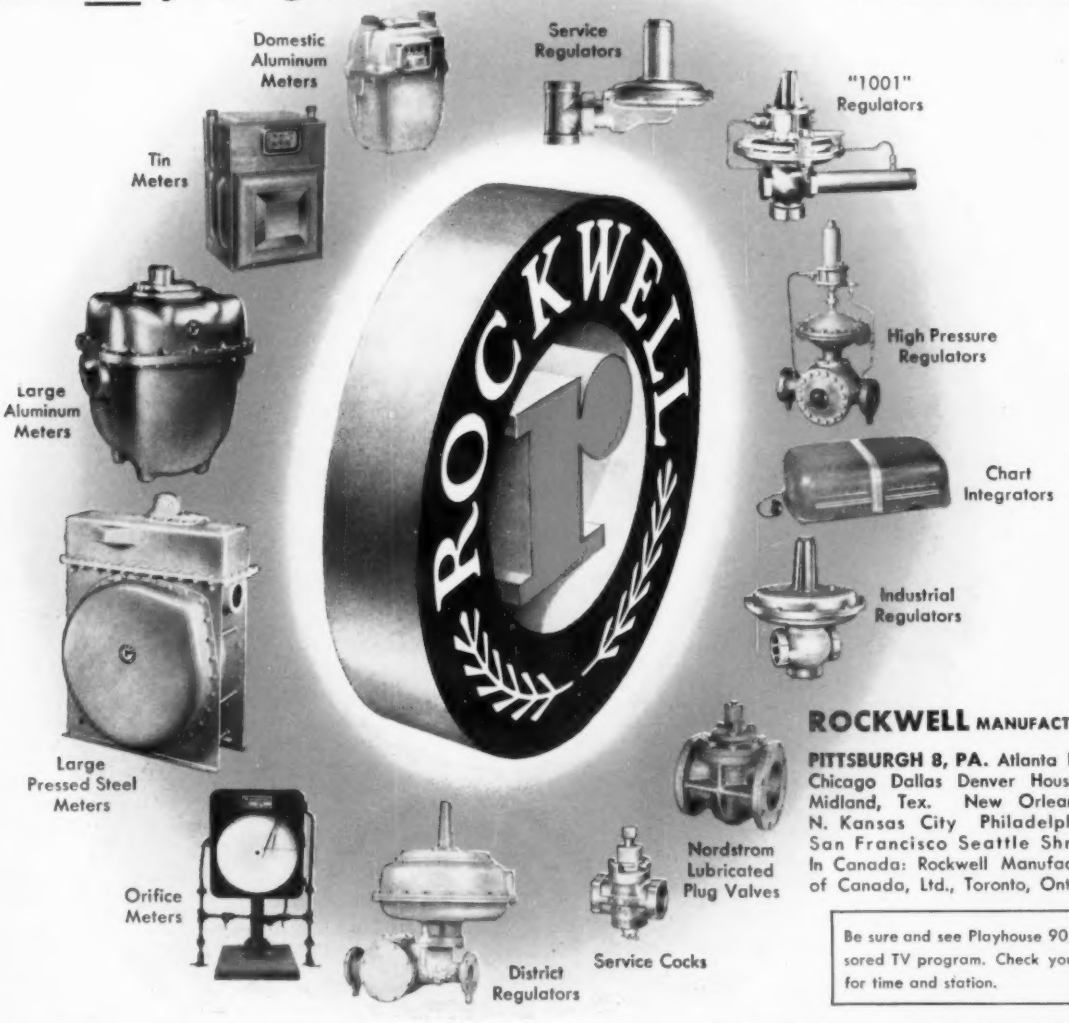

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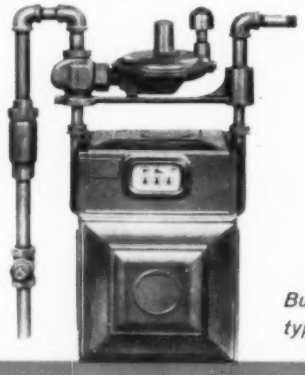

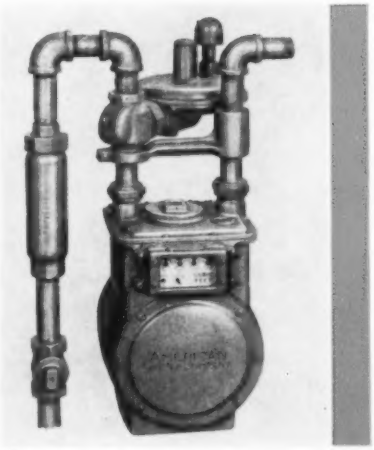

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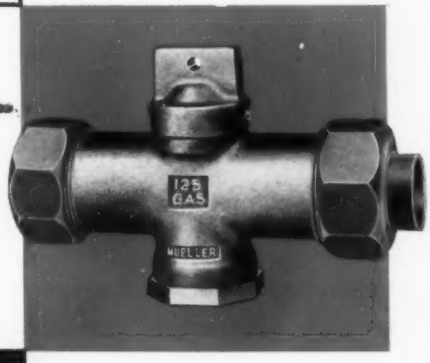

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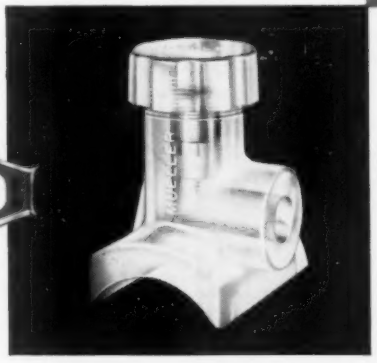

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Published as a Service to the Gas Industry by

ROCKWELL MANUFACTURING COMPANY

Pittsburgh 8, Pa.

GAS Thermally Thinking

A unified, cooperative industry

DURING January of this year while motoring through the snow-covered, iced-in country just south of Chicago, it was a real pleasure to see thousands of LPG tanks installed to give good gas-fuel service. These homes will be gas-accustomed dwellings when—and if—natural gas feeder pipelines and distribution systems are extended. But, even if the majority of these homes never get natural gas, the LPG boys are making an important contribution to our industry.

The question becomes, then, is the gas industry cognizant of the role the LPG dealers play and, more important, is our end of the over-all "gas" business fully cooperating to promote the mutual interests? In many parts of the country the answer is "yes"; in other sections the answer is "to a limited extent"; and in too many sections of the U.S. we are afraid the answer is "no."

The vital concept is that the consuming public of this country can get good gas service to supply energy for their prime household appliances regardless of the location of their homes. You can live in the city, in the suburbs, in the country, and, virtually, in the wilderness. Dependable gas service—natural, manufactured, or LPG—is usually available. We like to think of the LPG industry as our counterpart of the REA and taxmoney-financed power projects. We do not have to shovel our tax dollars into the LPG business.

Certainly, the LPG industry deserves every bit of our cooperation. They may not ask directly for your help as they tend to be rather independent entrepreneurs. But, as Julius Klein, GAMA's president put it ". . . a unified and cooperative gas industry moves forward."

As the industry moves forward, it must do so to the advantage of both types of gas service. It has done so where cooperative programs are working together to promote the fuel, gas, and all gas-fired appliances and equipment.

The cooperation that can be applied through sales efforts, display programs, sales promotions, and advertising are very obvious. But, it must go into additional fields.

Training projects, from safety to appliance and control servicing, can be mutually beneficial. An exchange of plans for future expansion will prove most valuable for both groups. And, customers should be made aware of the great group of people from both industries constantly studying the consumers' problems, the best service methods, and directing mutually supported research to develop still better utilization equipment.

J. Fred Ebdon

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GAS highlights

MARCH 1957

SPOT NEWS, TRENDS, COMMENT ON GAS INDUSTRY AFFAIRS

At the urging of independent natural gas producers around Shreveport, east Texas, and southern Arkansas, Rep. Overton Brooks of Louisiana introduced H. R. 3363—a bill to amend the Natural Gas Act, as amended—to the 1st session of the 85th Congress in late January. A quick perusal of the bill indicates that it is, with slight modification, the Harris bill of 1956. It is not the compromise bill natural gas producers, pipeliners and distributors hoped to see developed.

President Eisenhower's Budget message contained the passage ". . . I stated that (when returning the Harris-Fulbright bill to the 84th Congress sans signature. Ed.) legislation conforming to the basic objectives of the bill was needed. I am still of that opinion . . ." It is significant that the President touched on the idea of freeing natural gas producers from FPC regulation in his Budget speech rather than in the State of the Union address or in a special message.

There are several obvious conclusions to be drawn on the subject of freeing the independent producers from government control: (1) the public mind has pressure on the oil industry over the recent price increases of oils and gasolines following the mid-East fandango; (2) the public mind does not clearly separate the oil and natural gas industries, so control of the entire gas industry will have much public favor—make any free-the-producers bill very hard to pass; (3) more than 30 members of the House who supported the Harris bill have found other employment and their replacements might be pretty skittish on the subject after feeling the public's pulse; (4) the new bill from Rep. Brooks is probably designed to force the development of the compromise bill after hearings start on H. R. 3363.

Distribution companies have been getting those cold days from this year's "good old-time winter." After rather average, and in some cases disappointing, DDD weather during the past four or five heating seasons, January 1957 was a dilly. Cold weather generally everywhere and the cold fronts tended to linger a while. February shaped up as another record month for DDD's in recent years. Reports are flowing in on record sendouts that are taxing the facilities of some distribution companies.

Acquisition of Pacific Northwest Pipeline Corp. by Paul Kayser's El Paso Natural Gas Co. was completed on Jan. 31. Shortly thereafter, though specifically mentioned as being unrelated, Pacific Northwest announced its long expected plans to build a new eight-story headquarters office building in the Deseret center, Salt Lake City. Thus, major pipeline operations join with vast honey shipments originating from that point.

The gas-consuming public served by both El Paso and Pacific Northwest will benefit from the acquisition. The rapid growth of the California markets was beginning to tax El Paso's gas supply-reserve picture—as was evidenced in recent FPC rulings and recommendations—and the affiliation of the two companies assures an orderly, economical service of natural gas from the greatly augmented reserves to all of the far-western states. The flexibility of the associated systems should prove advantageous to customers.

However, the big advantage, as pointed out by Mr. Kayser in a release confirming the acquisition of Pacific Northwest, is ". . . access to new sources of supply in Canada, which is made possible through the acquisition. The combined system will be in a position to draw on these Canadian reserves, subject to the policies of the U. S. and Canadian governments, to the extent necessary to supplement U. S. resources," he said. "In addition, access to these reserves will be extremely helpful to El Paso in connection with maintaining its policy of marketing large quantities of residue gas produced in west Texas and New Mexico."

Several rate-making ideas and policies turned up recently. All are of interest to gas distribution companies and pipeliners alike as they could set patterns of the future. The first zone rates for a pipeline company were upheld; in effect, this makes it necessary for a transmission company to set up rates so that consumers close to gas fields pay less for gas than other customers located further away from the production sources. The Supreme Court upheld an FPC ruling that ordered Northern Natural to set up such zone rates in 1955. Then, down Florida way, Florida Power & Light has contracted to buy natural gas from the Houston-Coastal pipeline at a price pegged to that of fuel oil. The gas price will always be at a fixed amount under the prevailing price of fuel oil—the latter fuel is currently being used to fire their steam-electric boilers. Although there are no government regulations requiring this unique feature, other large industrials may try to follow this pattern in gas purchase contracts of the future.

How would you like a contract for 1 billion cu ft of natural gas per day for an 18-year period? United Gas Pipeline Corp., Sheveport, has such a contract with Houston Lighting & Power Co. The electric utility will use the gas to generate power for the rapidly growing Houston area.

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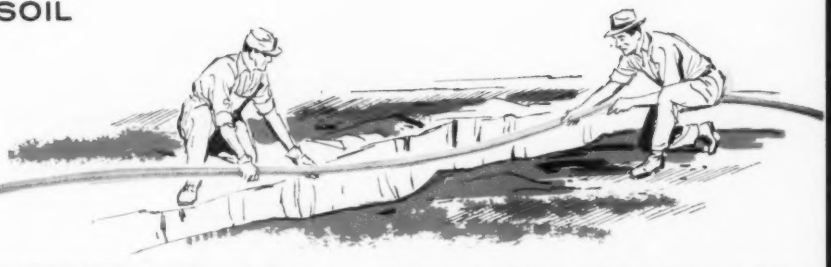

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A 16mm. sound-color film, "PLASTIC PIPELINES," is available upon request.

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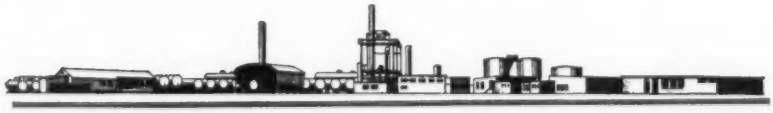

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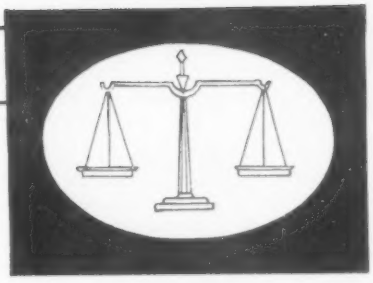

Producers ponder denial of rate increase

THE Federal Power Commission startled the gas industry by its first decision involving a proposed $2.6 million annual rate increase by major independent producers to an interstate gas pipeline company. In this pioneer decision, which was being watched by the three segments of the gas business, FPC denied the rate increase because the evidence failed to establish that the higher rates "are just and reasonable." FPC ruled that it is insufficient to present evidence of arm's-length bargaining and of the market value of the natural gas, without evidence that the proposed rates are no higher than necessary to encourage exploration and development of new gas reserves.

FPC had not formerly indicated that proof of the cost to render the gas service was important. FPC preferred the fair field price test in the past, but an appellate court annulled the commission's decision based on market price, and declared that a conventional rate base method should be used as a basis of comparison in order to ascertain a just and reasonable rate under the Natural Gas Act.

The majority opinion of FPC in this recent gas producer case gave these reasons for dismissing the proposed higher natural gas prices:

"The sum total of the evidence presented by the applicants at both hearings demonstrates that the increased rates were reached as a result of arm's-length bargaining and that they are within the range of the field prices in the pricing area in southern Louisiana. It further shows that to exact this price of 17 cents per Mcf, the applicants were required to grant additional considerations to Transcontinental, such as increased dedicated reserves. It is also clear from the evidence presented that the growing demands for gas by Transcontinental's customers in the industrial and heavily populated New York-New Jersey-Pennsylvania area are translated through Transcontinental to increasing demands for gas in the field. The applicants' evidence further tends to establish that the price of gas as sold by Transcontinental to its customers in the New York-New Jersey-Pennsylvania area competes favorably with the prices of coal and fuel oil for space heating and boiler fuel uses.

"Significantly, none of the evidence presented by the applicants is designed to show what rates are needed, either by individual producers or by the industry generally, to further exploration or other production functions. Neither can rates be determined in any way from the evidence before us.

"General statements by expert witnesses to the effect that increased rates are needed or desirable as an incentive to continued exploration and development of gas supplies are not evidence that the 17-cent rates are just and reasonable for the sales of gas to Transcontinental by these applicants.

"The applicants assert that the added considerations offered by Union Oil and Louisiana Land Co. and received by Transcontinental establish the justness and reasonableness of the 17-cent rates. Undoubtedly, these were the results of hard bargaining and Transcontinental may be in a stronger position in some respects than it was before these added considerations were extended to it by the sellers. The function of the regulatory agency, however, is not to probe the processes which culminated in these revised contractual relationships between the buyer and the sellers. Rather, our's is to find whether, as a result of these bargaining processes, the parties have fixed upon a rate which, in addition to protecting their private interests, is in the public interest. Viewed in this light, it is evident that no enumeration of added considerations nor succession of contractual concessions will, as a matter of law, demonstrate the reasonableness of a rate level. They are little more than evidence of the respective bargaining positions in which buyer and sellers found themselves at the time the transactions were concluded. They may well be evidence of the existence of arm's-length bargaining, but arm's-length bargaining, *per se*, is not proof of reasonableness.

"But the central issue presented is one of constitutional requirements and of our statutory power. The applicants claim that the Act does not limit the commission to the use of any particular formula or combination of formulae in determining a just and reasonable rate under section 4 (e). From that premise applicants infer that the commission may adopt the methods used to determine an unregulated price as a regulatory formula in rate making. Having taken this step in their reasoning, the applicants point to evidence tending to show that the 17-cent rate is a 'reasonable' market price. And as further support for their argument, they urge that the higher rates encourage continued exploration and development of gas supplies to the benefit both of ultimate consumers and producers.

"This reasoning is faulty. It supposes that because court decisions have held the commission is not limited to the use of any one formula or combination of formu-

*A monthly commentary on national and state developments by an expert in the field of utility law.

lae in determining just and reasonable rates that the commission is completely unfettered in its choice of rate-making method. Applicants argue that in the exercise of its freedom of choice, the commission should adopt the unregulated market as the proper guide in determining just and reasonable regulated rates. On this record it is not possible to strike a fair balance between investor and consumer interests. We cannot be sure that the rates are sufficient to promote exploration for and development of gas supplies and, at the same time, to provide the protection to the ultimate consumer contemplated by the Act. Indeed, a delegation of power to make rates interpreted as broadly as applicants would have it, would permit the unregulated market to determine rates in the name of regulation. Such a result would be contrary to the clear direction of the Act that this commission should regulate these rates. *Phillips Petroleum Co.* v. *Wisconsin*, 347 U. S. 672 (1954).

"Sections 4 and 5 of the Act set forth the end result test that rates charged by natural gas companies shall be 'just and reasonable.' This is both a statutory and a constitutional requirement. *Federal Power Commission* v. *Natural Gas Pipeline Co. of America*, 315 U. S. 575, 586 (1942). We think the recent decision of the Court of Appeals for the District of Columbia Circuit in *City of Detroit* v. *Federal Power Commission*, 230 F. 2d 810 (C.A.D.C., 1956), *certiorari* denied, 352 U. S. 829, is controlling here. In referring the case back to the commission for the taking of additional evidence, the Court held that in rate making the commission must always 'relate its action to the primary aim of the Act to guard the consumer against excessive rates. If the commission contemplates increasing rates for the purpose of encouraging exploration and development, . . . it must see to it that the increase is in fact needed, and is no more than is needed, for the purpose. Further than this we think the commission cannot go without additional authority from Congress.' " * * *

"The Act requires us to determine the justness and reasonableness of rate levels and structures by the use of standards not contained in the rates themselves. The Constitution extends its protection to all the independent-producing segment as well as to the pipeline segment of the natural gas industry. It is impossible to meet the requirements of either the Act or the Constitution unless we can determine the revenue requirements of the industry we must regulate and the effect of the rate in question on its earning capacity. The record as it now stands is deficient in terms of both the Act and the Constitution."

Knowing that this first major producer rate case decision would disturb many persons, Commissioner Connole illuminated the subject in a speech to the New York Society of Security Analysts. He asserted:

"I am sure you are interested in how the policy expressed in the *Union* case will affect the financial integrity and the attractiveness of producing properties as a place for investors' capital.

"The first thing to bear in mind in attempting to evaluate what the commission did in the *Union* case, is to avoid the temptation of attaching too much significance to what the commission has said and to stop reading between the lines for language designed to place the entire producing industry in the same straight jacket of rigid regulation in which the so-called old line utilities find themselves.

"The fact of the matter is that in the present state of the law the commission had no choice but to rule as it did in view of the plain language of the District of Columbia Circuit Court's decision in the *Panhandle* case. Even one who disagrees most strenuously with the wisdom of the Court's determination could not, in my opinion, misunderstand what it said. There simply was no other place for the commission to go once the Court had spoken and the United States Supreme Court had twice refused to review it.

"Of course, personally, I am convinced that unless some means is devised to measure the length and breadth of this vague matter of justness and reasonableness of producer prices, the whole business of natural gas regulation might as well be abandoned. I think it is common knowledge that virtually every pipeline rate increase filed with the commission in recent years has been prompted by increases in field prices for natural gas. With the constitutional guarantee that such costs be recovered in full, if they are reasonable and within the power of the company to charge, the regulatory body, whether concerned with the pipeline or the distributor, has no choice but to pass that increase along. If meaningful regulation is to continue, some method must be found for determining whether these increases are just and reasonable. With pipeline prices already touching the ceilings in some fuel competitive areas, this is not an academic exercise. It is stubborn economic fact. As the commission majority stated in the *Union* case, our responsibility 'is to find whether, as a result of these bargaining processes, the parties have fixed upon a rate which in addition to protecting their private interests, is in the public interest.' 'Arm's-length bargaining' said the commission 'is not proof of reasonableness.'

"I have suggested on other occasions, and the idea seems to be gaining general recognition, that revenue requirements, however measured, must form the fundamental basis on which any objective standard of justness and reasonableness would be measured.

"Now please notice: I said 'fundamental basis' and notice I used the words 'objective standard.' The significance of the emphasis on fundamental basis is this: Revenue requirements need not, in my judgment, be determined for each individual sale from each individual wellhead, field gathering point, gasoline plant, tail gate, or other point of sale. But revenue requirements should be used when setting out touch stones against which to determine the principles to measure the reasonableness of these particular sales. In other words, the starting point ought not to be how much can the gas bring. Rather it should be, how much does the industry need to compensate it adequately and to assure the continuation of exploration and development." ■

Let's get technical about WALWORTH LUBRICATED PLUG VALVES for pipeline service

Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

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For buried pipelines — yoke design permits simple attachment of handwheel and lubrication extensions without modifying the gearcase.

In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.

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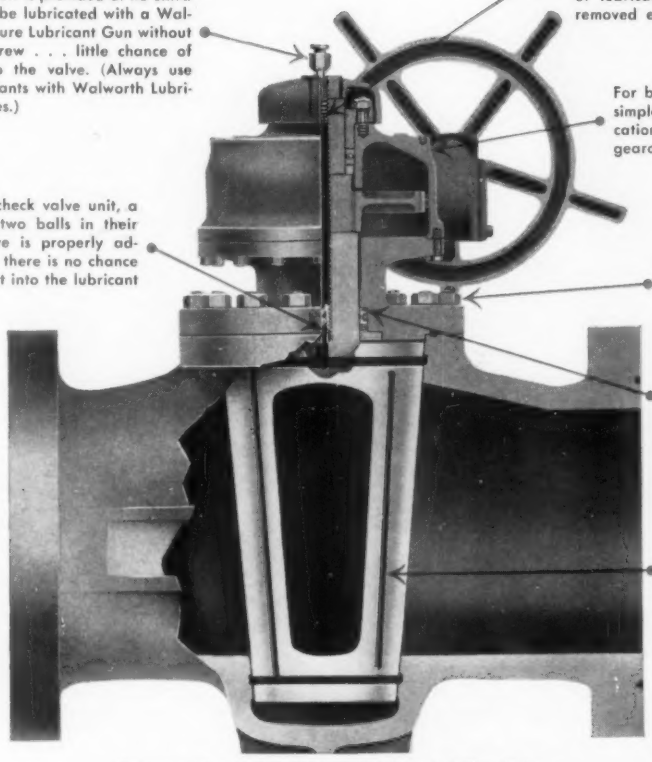

Two overlapping Teflon packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low breakout torque . . . plug turns easier. Packing serves only as a seal and is not used to hold the plug in its seat.

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WASHINGTON

Passage of gas bill still not a "sure thing"

By NEIL REGEIMBAL
GAS Washington Bureau

PRESIDENT EISENHOWER'S firm but general endorsement of legislation to free independent natural gas producers hasn't yet greased the skids enough to make passage a sure thing.

Mr. Eisenhower's endorsement raised eyebrows among both backers and opponents of the ill-fated Harris bill by relating his earlier insistence of consumer protection to assuring supplies of gas, rather than strict price protection.

But that doesn't solve the problem. There is still some opposition to any type of bill freeing independent producers, although it is not believed to be as strong as in the past two years. Congressional backers of the Harris bill are still grumpy about what they consider a "sell-out" when the President vetoed the measure last year.

The President, in his budget message to Congress, insisted that he still believes that legislation "conforming to the basic objectives" of the Harris bill is needed. Then he added:

"It is essential that consumers of natural gas be protected. We must endeavor to make sure that there will be continued exploration and development of adequate field supplies of gas, and that producers' sales prices are arrived at fairly and competitively.

"In this way, and with authority vested in the Federal Power Commission to regulate interstate pipelines as to the price at which gas may be charged as an item of cost in fixing their rates, the price to the public will be fair.

"Legislation freeing gas producers from public utility-type regulation is essential if the incentives to find and develop new supplies of gas are to be preserved and sales of gas to interstate markets are not to be discouraged to the detriment of both consumers and producers, as well as the national interest."

Sounds like the answer to a prayer for backers of gas legislation; a body blow to opponents. But it's not necessarily either.

Speaker of the House Sam Rayburn, crusty veteran of long years in Congress, is making no bones about demanding that if there is to be another gas bill, it should bear a Republican label. Last year's White House veto was a political maneuver, he grumbles.

Whether they can stick a Republican tag on the gas bill is another question. It appears doubtful. Most observers believe that sooner than see no bill, Representative Rayburn, coming from the gas-producing state of Texas, will eventually capitulate and permit it to carry a Democratic or bi-partisan tag.

There is also the belief among some gas bill backers that the industry should not have the measure introduced until the current storm of protest over crude oil price increases blows over.

The gas and oil industries are thought of as one industry in the public mind, some backers fear.

There is no shortage of gas bills even this early in the session. Among those introduced are a measure by Rep. Frank Ikard (D.-Texas), which would remove from Federal Power Commission jurisdiction "any sale of natural gas at or prior to the point of delivery" into interstate transmission facilities. Representative Ikard's bill would also require that the price of gas produced by transmission companies would be on the fair commodity value of gas in the field where it was produced.

Rep. John Bell Williams (D.-Miss.), is sponsoring a measure to provide that the Natural Gas Act would not apply to the sale of natural gas by an independent producer as long as he was not engaged in interstate gas transmission.

Rep. John W. Heselton (R.-Mass.), has reintroduced his measure to authorize the FPC to prescribe safety requirements for natural gas companies. The commission would be given a free hand to prescribe controls over construction and maintenance of gas transportation facilities.

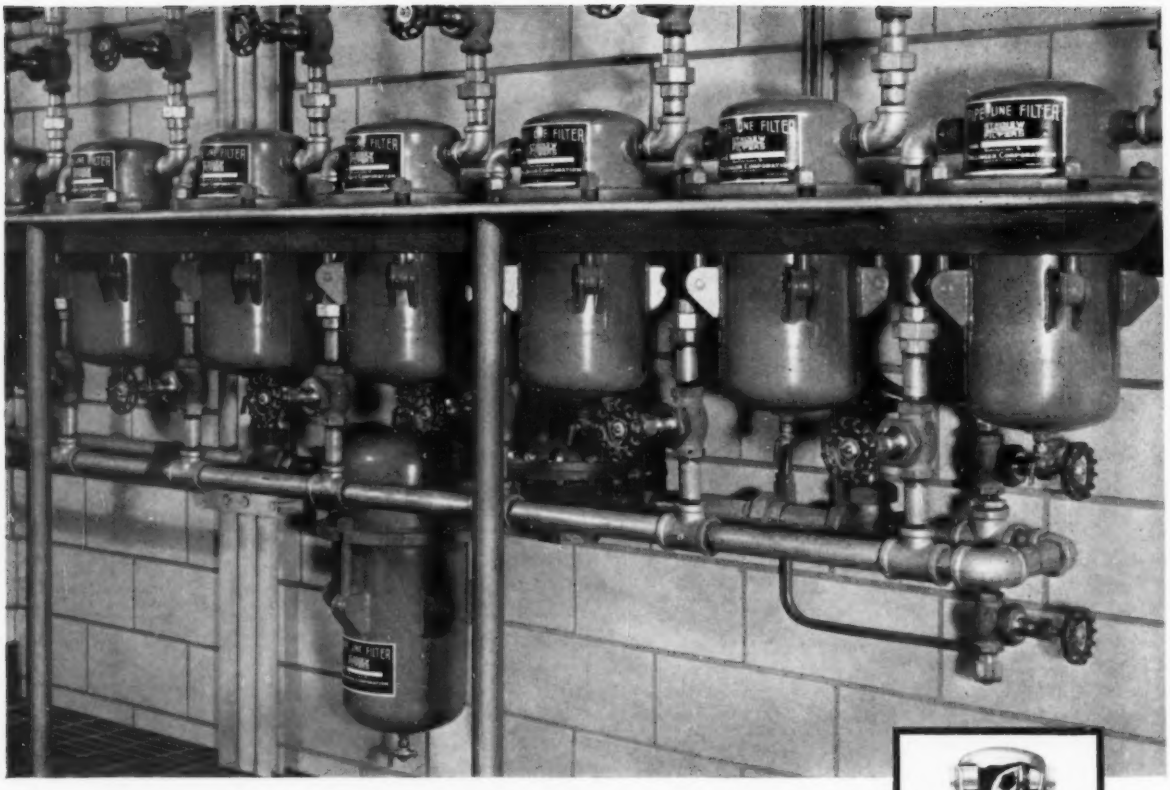
While the gas industry trains for possible new contests over gas legislation bill, some of the sting of last year's fiasco is wearing off.

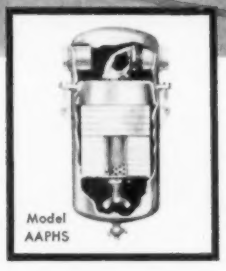
Sen. John L. McClellan, chairman of a special committee formed to probe lobbying, says he can't find the "body of evidence" of questionable activities to which the President referred in his veto message.

The facts and information the committee obtained in response to its probe were negligible, Senator McClellan said. He added that some practices were uncovered not necessarily in connection with the gas bill "that are so clearly fraudulent and misleading that they should be prohibited by criminal penalties."

Pressure for gas legislation is building up.

The U. S. Supreme Court's refusal to review a federal appeals court ruling that FPC orders suspending rate increases are not reviewable by courts until the entire case is settled is helping. ■





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Successful Staynew filter applications abound at Russell electrical station of the Rochester Gas & Electric Corporation.

When Russell opened in 1949, the utility specified Staynew absorption filters, Model AAPHS, for supply air to its automatic boiler controls after coke and then charcoal filters had failed.

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In another filter application, air taken into the utility's four large carbon-ring compressors is filtered in each instance by a Staynew Model DS250 B4 air-intake filter.

A third filter application is the use of a Staynew Model DS350 B5 on each of four other compressors whose output removes soot from boiler walls and keeps slag off arches and passes. On two additional compressors, also used for soot-blowing operations, two larger Staynew filters, Model DS825 B8, are installed.

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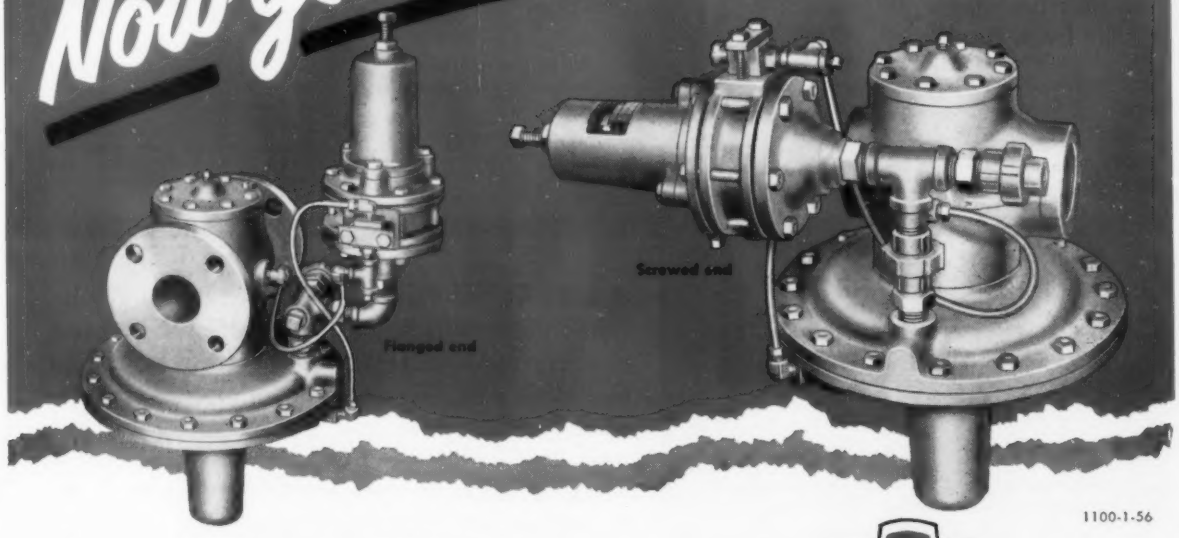

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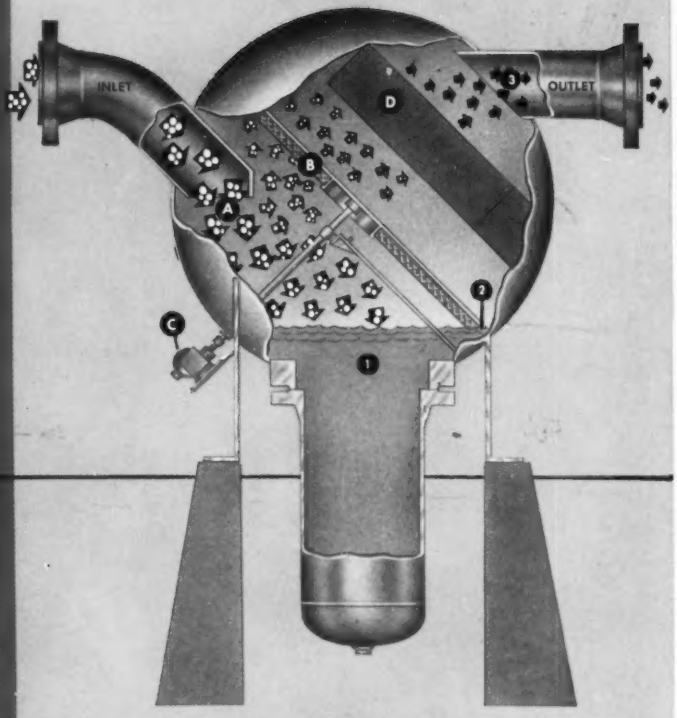
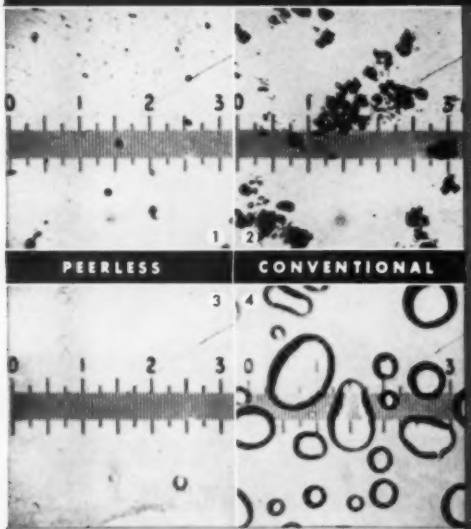


(A) The majority of incoming liquid and solid particles are directed down into reservoir. 1

(B) Lighter solid particles carried by gas stream are separated on surfaces of contactor which are kept wet and clean by revolving through liquid reservoir. 2

(C) Contactor is revolved by explosion-proof gear motor.

(D) Mist Extractor removes any remaining liquid particles from gas stream prior to outlet. 3



These photographs were made of microscope slides introduced downstream of the Scrubosphere and a conventional vertical oil bath cleaner under the same operating conditions. Plates 1 and 2 show the comparative amounts of iron oxide not removed with the amounts introduced being identical. Plates 3 and 4 indicate comparative oil loss with vapor rate through the vessels being the same.

LOOK AT THIS TEST The test at the left indicates the superiority of Peerless Scrubosphere over conventional oil bath dust scrubbers. The SCRUBOSPHERE operates with no loss of efficiency at low flows, minimum liquid loss, and very low pressure drop. Other outstanding features include easy vessel access with removable self-cleaning contactor, a sump for slugs of solid or liquid particles, and minimum cost.

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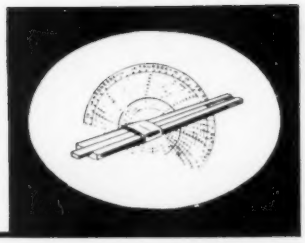


By GUY CORFIELD

Gas chromatography

Gas chromatography is a new method or system of gas analysis —at least it is new as far as practical application and general use are concerned. It is also called vapor phase chromatography and vapor fractometry. It consists essentially of sweeping the gas or vapor to be analyzed, through a separating column, by means of an inert carrier gas. The carrier gas is usually helium, but can be nitrogen or dry air if great accuracy is not required. The column is a tube, generally of stainless steel 0.25 in. in diameter, about 6 ft long, bent in the form of a U or W to conserve space. If the column is of the adsorption type, for separation of light gases, it is packed with charcoal, alumina or silica gel. If it is of the liquid partition type, for separation of a wider range of gases including heavier vapors such as the C_6 and C_7 hydrocarbons, it is packed with a small-particle inert solid coated with a high-boiling point liquid; a typical combination, suitable for analyzing a "wet" natural gas, is tetraisobutylene coated on celite; the tetraisobutylene is the active ingredient.

The principle of operation is that the components in the gas sample mixture, carried into the column by the carrier gas, have a different affinity for or firmness of retention by the material in the column, and are therefore flushed out of the column separately at successive times. In a natural gas, for instance, using helium as a carrier, nitrogen would come off first, followed by methane, ethane, carbon dioxide, propane, butane, etc. The gases are identified by thermal conductivity, using a Wheatstone bridge type detector in which one leg is exposed to the carrier gas, and the other to the carrier gas plus the single component emerging from the column, the unbalance voltage caused by the characteristic thermal conductivity of the component being measured and shown on a standard electrical recorder chart. By keeping constant the rate of sample introduction, chart travel, and temperature, the recorder chart will show time of retention of each component in the column, and amount of each component issuing from the column, as a series of peaks; and from the height and spacing of these peaks, and the area under them, the gas analysis can be calculated. An analysis of a manufactured gas, hydrogen through C_3, with a silica gel column, takes about 30 minutes; hydrogen through C_5, with a liquid partition column, requires about 60 minutes. By using various column packings suitable to the sample being analyzed, various size samples, etc., almost any desired separation and degree of accuracy can be attained. Burrell, for instance, states that its Kromo-Tog will, in less than 18 minutes, accurately separate a complex C_4 fraction into identifiable butanes, butenes and butadienes.

It is claimed that the analytical capabilities of the mass spectrometer can be equaled with an investment in chromatographic apparatus not much greater than that for an Orsat apparatus, and that for practical plant control the gas chromatograph will replace low temperature fractionation, and charcoal adsorption for wet gas analysis, because of its speed, specific results, and adaptability to relatively continuous operation. One manufacturer claims development of a "continuous - intermittent" unit that can exercise remote control at 500-ft distance.

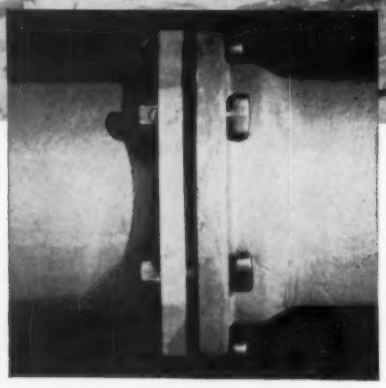
Non-inflammable hydraulic fluids

Hydraulic fluids are used to transmit pressure impulse through a piping, valve or cylinder system. Familiar examples are the brake system of the modern automobile, or the valve and generator control system of a manufactured gas plant. Industry in general uses hydraulic systems extensively, and increasingly with the advent of automation remote control. Conventionally the hydraulic fluid is a petroleum oil or petroleum base liquid and is therefore inflammable, and in the event of a rupture a serious fire can develop and be intensified if the oil sprays on a hot surface or flame.

Where this potential fire hazard exists, non - inflammable hydraulic fluids are coming into use, and considerable research has been devoted to their formulation. One group of fire-resistant fluids is termed "hydrolubes" which are mixtures of ethylene glycol and other additives with water. The other group consists principally of a complex organic chemical "family" called phosphate esters.

All these fluids are from two to four times more expensive than the oils they are supplanting, and when the phosphate esters are put into a system it usually means installation of new seals and gaskets. However, the additional expense is offset by lower plant insurance rates, avoidance of down time from contributory fires, and general improvement in personnel and equipment safety.

WHO KNOWS HOW LONG



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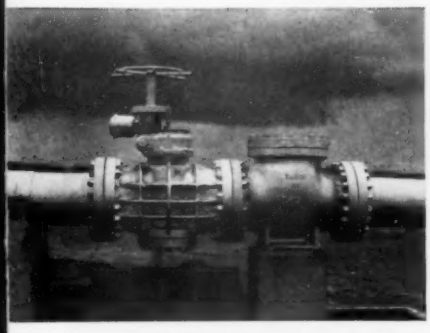

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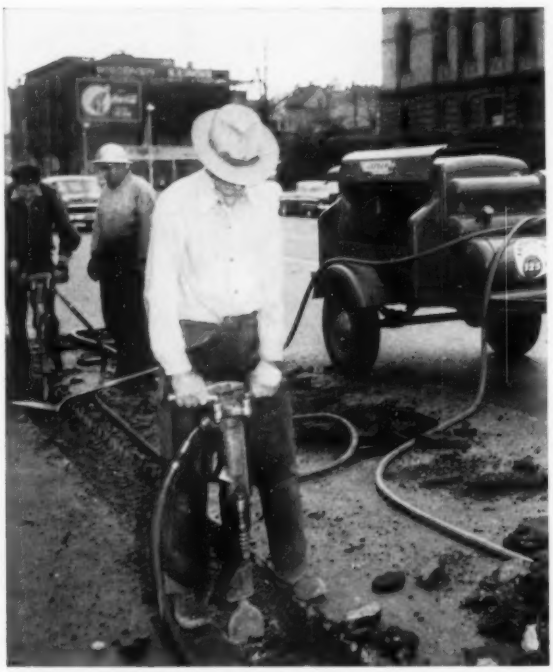


FAST TRENCHING: Jaeger "125" maintains full pressure in two #25 Thor breakers. Speeds trench cutting and other work with power tools.

Installing 12" Mechanical Joint cast iron pipe gas main in New Jersey.

America's oldest pipe is its newest

Cast iron pipe's ability to serve for centuries is well known. Cast iron mains laid by 40 American gas utilities over a century ago are still serving; hundreds of others have been in service 50 years and more.

Impressive as this record is, cast iron is not content to rest on it. Today's modernized cast iron pipe, centrifugally cast by advanced metallurgical techniques, is even tougher, stronger, more uniform. More dependable . . . better able than ever to deliver the long life and long-term economy a gas installation requires.

You specify wisely when you specify cast iron pipe.

You Can Rely On Cast Iron Pipe

- Standardized mechanical joints are bottle-tight for usual gas pressures . . . and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortage. Cast Iron Pipe is available.

U.S. cast iron PIPE

CAST IRON

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

HEAVIEST-DUTY, LARGEST GPM HYDRAULIC SYSTEMS AVAILABLE
EASILY OPERATED... FAST CYCLING...

HOPTO®

DIGGER • SHOVEL • CRANE

Gives you MORE
WITH BACKHOE OR SHOVEL BUCKET

Put a man on a HOPTO and he's *twice* the money-maker! HOPTO's effortless 20-second cycles . . . HOPTO's *new*, more powerful triple tandem pump and split hydraulic system . . . and HOPTO's fast switch from backhoe to shovel give you *more* for your money . . . *more* for your time! Get the facts on HOPTO—new and better than ever!

30 SECOND SET-UP!
Independently controlled hydraulic outriggers level and stabilize unit . . . *from operators seat* . . . in thirty seconds!

HOPTO 360-57-90 takes a half-yard bite, *is the only unit with a 360° continuous swing*, and cycles fast with backhoe or shovel bucket. Mounts on truck or carrier.

HOPTO 185 SPR gives you an integral built digger-shovel-crane on rubber. Handles up to 30" bucket. Rolls to job-site at highway speeds.

HOPTO 190 SPC, the complete unit model that packs real work-capacity on tracks in a mobile, compact unit that gets in anywhere . . . even on marshy soils.

HOPTO 200 DTM-57-72 mounts on any 2-ton or larger truck, handles up to 30" backhoe or shovel.

HOPTO 80 CTM mounts on a crawler tractor, handles up to 30" bucket, cuts costs by using power you now have.

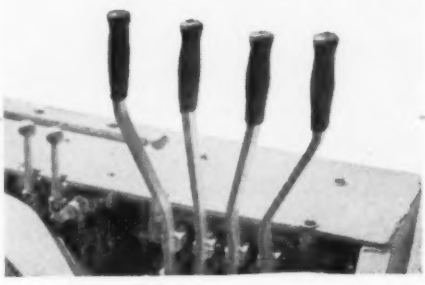
*SPECIFICATIONS

MODEL	SWING	REACH	DIGGING DEPTH	LOADING CLEARANCE BACKHOE	LOADING CLEARANCE SHOVEL BUCKET
360-57-90	360°	30'	20'-0"	15'-6"	16'-10"
200 DTM-57-72	200°	19'	13'-6"	11'-6"	9'-3"
190 SPC	190°	17'-2"	11'-3"	9'-3"	9'-7"
185 SPR	185°	17'-2"	11'-3"	9'-3"	9'-7"
80 CTM	180°	14'-6"	10'-0"	7'-1"	7'-5"

*180° BUCKET TILT ON ALL MODELS

One of the twelve HOPTO models is tailor-made for you. Write stating your needs and complete information on the unit to fit your requirements will be promptly forwarded.

BADGER MACHINE COMPANY
WINONA, MINNESOTA DEPT. 29



NEW SIMPLE CONTROLS
An hour's practice and a handyman can safely handle a HOPTO! Four handy levers control boom and bucket; two separate levers give individual control of each outrigger for fast leveling and stabilizing from operator's seat . . . in half a minute!

Underground corrosion

robs $600,000,000 a year!*

But Naugatuck KRALASTIC can't corrode!

It can't rust or rot—is free from electrolytic action—impervious to water and the usual soil elements—highly resistant to most chemicals. Pipe made of Kralastic® rubber-resin never needs coating, lining or anode protection.

What's more, amazingly tough Kralastic pipe gives a host of *other* advantages over conventional pipe materials.

- Kralastic pipe is extremely lightweight—needs no heavy handling equipment or costly bedding.
- It can be snaked through many existing lines—eliminates much time and money-wasting ditching.
- It offers extremely low internal friction—will not accumulate scale.
- It can be quickly and easily solvent welded—by relatively unskilled workers. Or it may be threaded and used with threaded fittings.
- Kralastic has outstanding impact strength—even at Arctic temperatures.

In short, Kralastic is a *non-corroding* pipe material with a combination of properties *no other pipe material can match.*

Molders and extruders are finding KRALASTIC ideal for such products as combs; wheels; window channels; cases for small appliances such as hearing aids and electric shavers; housings for office and other types of machines, as well as for pipe.

Better look into Kralastic today. Simply write on your letterhead to the address below.

*Estimate of the U. S. Government National Bureau of Standards.

US RUBBER

United States Rubber

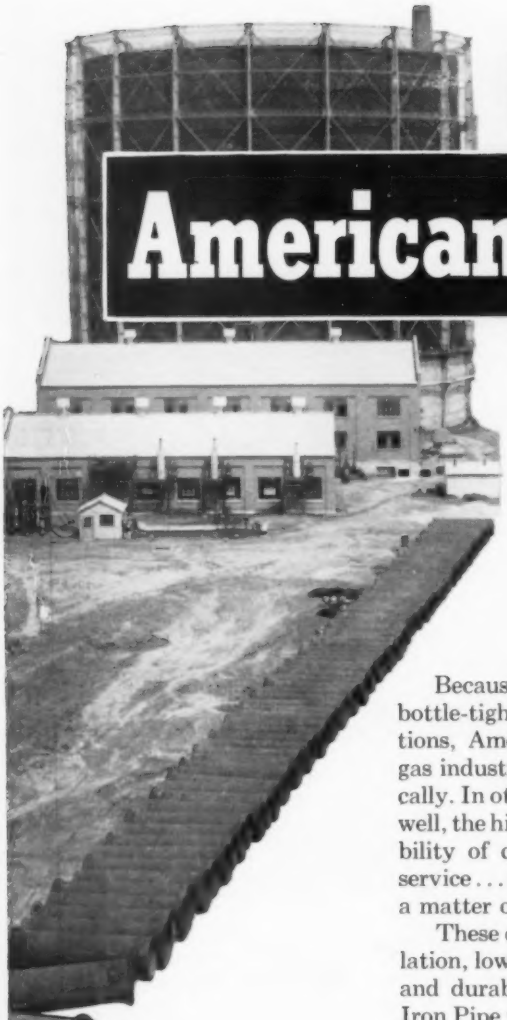
Naugatuck Chemical Division

Naugatuck, Connecticut

BRANCHES: Akron • Boston • Gastonia, N.C. • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario
Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

Bottle-Tight . . .

American Cast Iron Pipe

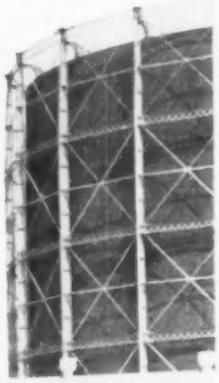


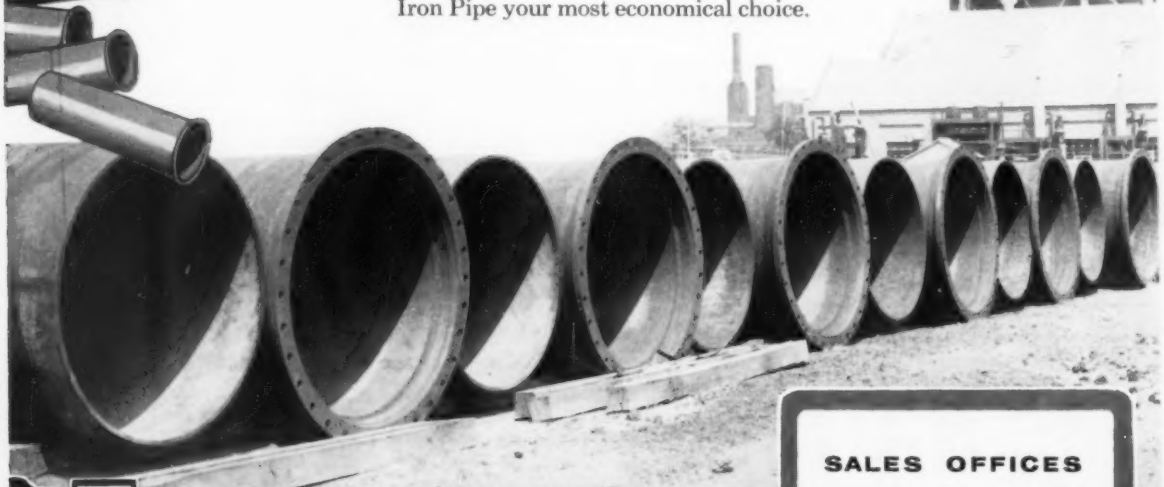
For bottle-tight installation plus lower annual costs, nothing compares with mechanical joint cast iron pipe.

Since its introduction twenty-five years ago by the American Cast Iron Pipe Company, it has become standard with many large gas utilities . . . standard in cities such as Indianapolis, Baltimore, Atlanta and Chicago. American Double-X Cast Iron Pipe is the *original* standardized mechanical joint.

Because its trouble-free joints stay bottle-tight even under extreme conditions, American Double-X serves the gas industry dependably and economically. In other utilities and industries as well, the high strength and rugged durability of cast iron pipe means longer service . . . a century and more is already a matter of record.

These qualities—bottle-tight installation, lower annual cost, high strength and durability—make American Cast Iron Pipe your most economical choice.





AMERICAN CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

SALES OFFICES

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Ouija boards are passé

Time was, when a person had a question, out would come the ouija board for an answer. This wasn't too accurate a system, of course . . . but a lot of people put a lot of faith in what the ouija board told them.

Times change — and today accuracy is the keyword. That's why the modern business publication wants its circulation audited.

In joining BPA* the publisher is taking an important step toward sound and accurate planning in your behalf. It means that he is checking, double-checking and constantly rechecking —

- **Who you are**
- **Where you work**
- **What your job is**

He wants and needs this information — and the BPA* audit can assure both him and his advertisers that he is getting his magazine into the hands of people *qualified by their common interests* to receive it. It helps him to give you —

- **Editorials that will *help you in your work***
- **Advertising that will *have value to you***

He can serve you even better if you will complete surveys and questionnaires which he may send you, and if you will give him your thoughts and opinions on the editorials and advertisements in his magazine.

You, the reader, are the *key person* to the publisher — and the BPA* audit helps him in his never-ending effort to think about you and design his magazine for you.

You, the reader, benefit when the circulation of a publication is audited by . . .

***BUSINESS PUBLICATIONS AUDIT OF CIRCULATION, INC.**
420 Lexington Avenue New York 17, N. Y.

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A Non-Profit, Tripartite Membership Corporation of Advertisers, Advertising Agencies and Business Publications

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Finest in the Industry!

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SERVICE REGULATORS

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  Full capacity internal relief valve.
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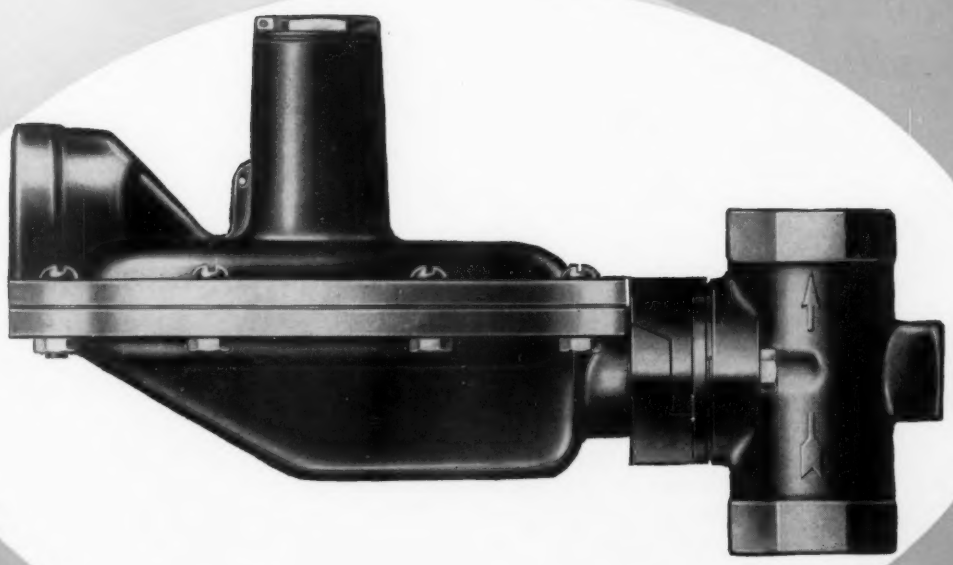
  Turbo booster tube develops capacity in excess of industry requirements.
- **ECONOMY**
  Lower unit price.
- **LIGHT WEIGHT**
  Shipping costs reduced 50%.
- **IMPROVED AIRCRAFT TYPE FLANGE UNION**
  Permits free 360° rotation of diaphragm assembly. Only a socket or Crescent wrench is necessary to replace disc or service regulator.



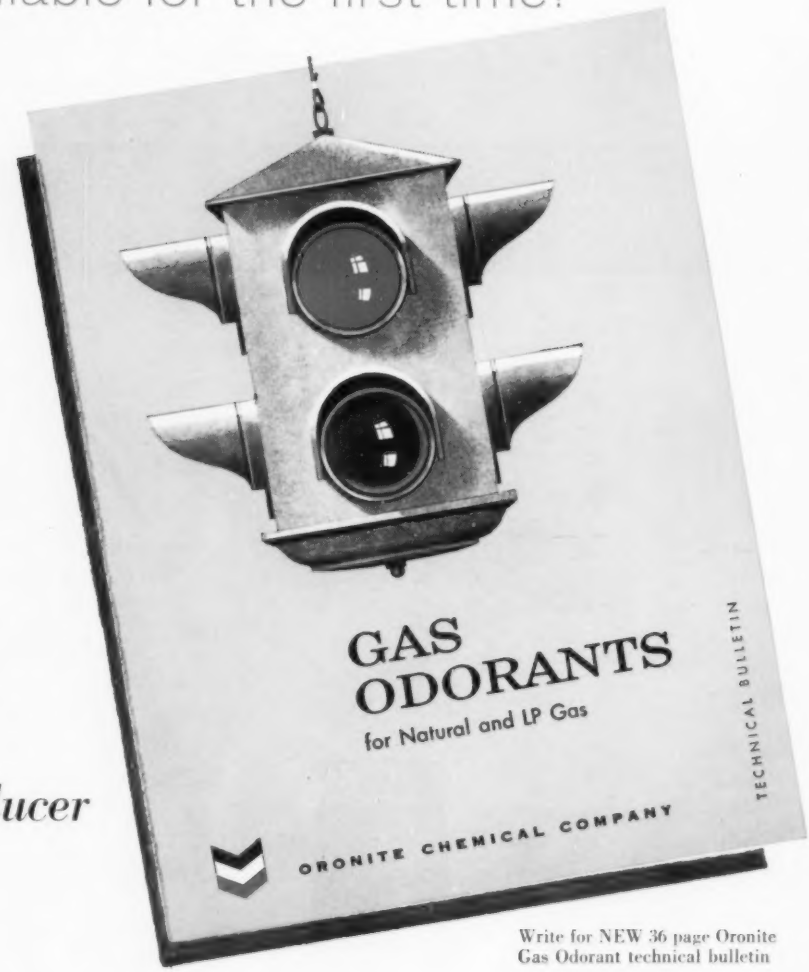
GOVERNOR COMPANY

Woodstock, Ontario

Available for the first time!

A complete story on Gas Odorants

...from the leading producer



Write for NEW 36 page Oronite Gas Odorant technical bulletin

An Oronite® odorant will best fit your requirements —choose it from this list of quality odorants

Calodorant® "C" — best quality sulfide type odorant
Calodorant® "B-1" — a sulfide odorant at a mercaptan price
Alert® "80" — best economy-priced, quality mercaptan odorant
LPG Odorant — tailor-made from a selected mercaptan cut
Ethyl Mercaptan — an odorant of highest quality and purity for LP-Gas.

To get Oronite's complete story on gas odorants, fill in the coupon below or write to the Oronite office nearest you.

ORONITE CHEMICAL COMPANY

Executive Offices
200 Bush Street, San Francisco 20, California

Sales Offices
San Francisco, New York, Wilmington, Chicago, Dallas, Cincinnati, Los Angeles

European Office
36, Avenue William-Favre, Geneva, Switzerland

4175

Oronite Chemical Company
200 Bush St., Dept. "O"
San Francisco 20, Calif.

☐ Please send me your new gas odorant technical bulletin.
☐ Please have an Oronite gas odorant specialist call on me regarding our requirements.

Name_____
Firm_____ Title_____
City_____ State_____

from foundry to finished product...

Quality first

Quality, above all things, is the guide for Mueller manufacturing operations and the standard by which all Mueller products are made.

From raw materials in the foundry to final inspection before shipping, highest quality in workmanship, materials and design are united to form a superior product that will serve *dependably* through the years.

Mueller Co. was founded with a tradition of "Quality and Dependability"—a tradition that has been rigidly maintained through a century of service!

A huge vertical boring mill faces the bottom by-pass of a 30" gate valve hub end body. Precise machinery produces precise products.

A lock nut of a Lub-O-Seal meter stop is adjusted to a specified tightness by this assemblyman using a torque gauge.

Each day, incoming raw materials are analyzed by laboratory testing to insure rigid adherence to industry standards.

This optical device gives a greatly

Performance
in the making

Skilled Mueller craftsmen use lengthy experience, careful training and modern machine tools to produce water and gas products that give superior performance to you—the user...and their work is proved by many rigid inspections and exacting tests.

IN THE FOUNDRIES

Sands are graded, tempered and treated to assure perfect molds from patterns and core boxes fashioned by skilled artisans in the pattern shop of Mueller Co.

Six modern iron and brass foundries feed rich, creamy, carefully-analyzed molten-metal to hungry molds for castings that will become curb or corporation stop bodies, curb boxes and other Mueller products. The castings are thoroughly inspected before moving on to the modern machine shops.

IN THE MACHINE SHOPS

Precise machine tools, operated by expert machinists, cut, turn, bore, grind, thread and work the castings into precision parts. Extremely close tolerances insure perfect mating of component parts and long-lived operating ease.

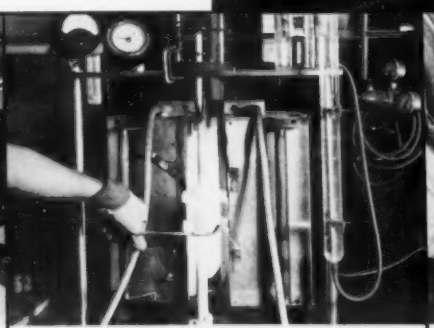
Machined parts are inspected with precise instruments, ranging from micrometers to microscopes, to assure accuracy of each piece.

IN ASSEMBLY

Individual parts are brought together for assembling by proficient craftsmen. These men prepare the finished product to detailed specifications, with each step checked by the ever-critical inspectors, making sure that the required perfection has been attained.

Each Mueller craftsman is instilled with the need for dependable, long-lived equipment in the essential gas and water industry...each does his part to create a product that will fulfill that need. Superior performance is the product of Mueller Co.

Exacting specifications are established by experienced engineers who know customer requirements and material qualities.



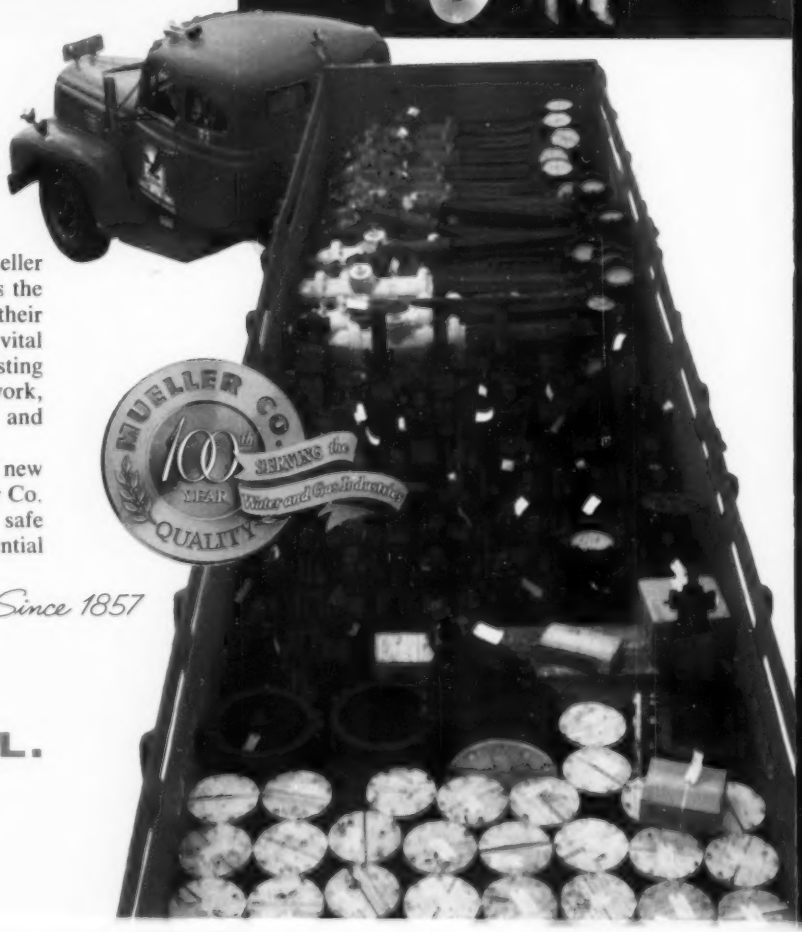
Molding sands are checked by a technician for compressive strength, permeability, moisture content and density, assuring flawless castings.

A semi-automatic machine cuts and threads both ends of a curb stop simultaneously to prevent distortion and damage.

Surface smoothness and contour is revealed by a Profilometer, a precise instrument that helps a corps of inspectors in their work.

The microstructure of raw materials and metal in products are inspected under extreme magnification in the metallograph.

This optical device gives a greatly enlarged picture of the contour of tools, gauges and products. Rigid tolerances are easily maintained.



"Take it away!"

The call of the shipping foreman starts Mueller products to every section of the country...starts the products to work where they can prove that their built-in quality means uninterrupted service for vital gas and water industries. The efficient, long-lasting service provided by Mueller products at work, presents ample proof that quality in design and manufacture pays off:

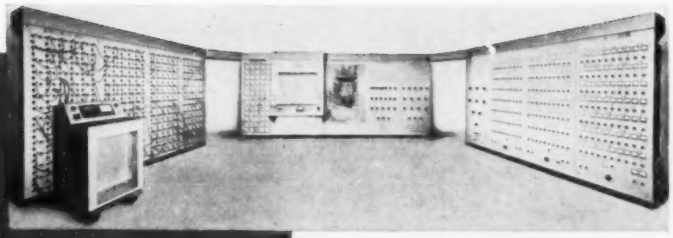
Though new products will be developed, and new needs will arise, the quality standard of Mueller Co. will continue unchanged to assure dependable, safe and long-lived product performance for our essential water and gas industries.

Since 1857

MUELLER CO.

DECATUR, ILL.

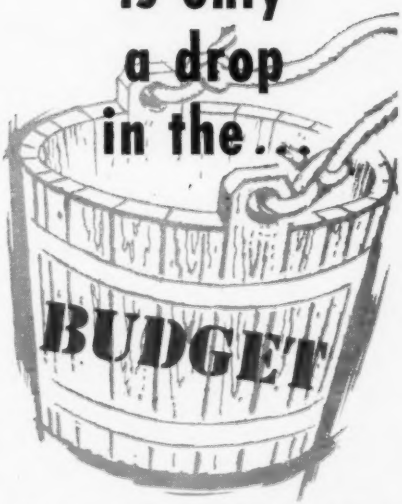
Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario



When You Spend Millions

TO KEEP PACE WITH THE GROWTH AND PROGRESS OF A METROPOLITAN AREA . . .

The Cost of a McILROY FLUID NETWORK ANALYZER is only a drop in the . . .



THE KIPLINGER WASHINGTON LETTER of Dec. 22, 1956 says:—

"Total population of the U. S. grows so fast you lose track of it. 40 years ago, 100,000,000. 10 years ago, 141,000,000. NOW 170,000,000. By 1975, 221,000,000 . . . and that's a lot of people to be fed, clothed, housed, and otherwise serviced . . . potential customers within our system."

THE NEW, DYNAMIC AMERICA IS HERE

Automation, nuclear power, man-made satellites are no longer a dream and five-year plans become obsolete overnight. To meet this huge, dynamic growth in population

ADEQUATE DISTRIBUTION BY UTILITIES DEMANDS LONG RANGE PLANS

To THE GAS INDUSTRY this means that during the lifetime of a McIlroy Analyzer distribution facilities in many cases must be more than doubled — involving endless surveys, analyses, plans construction and equipment . . .

ALL COSTING MILLIONS IN MONEY!

To spend far ahead, you must be able to see far ahead. And that is the Analyzer's job — to help you look before you leap. With amazing speed, and extremely low final cost the McIlroy checks the validity of each step in your proposed program *before* you spend a cent.

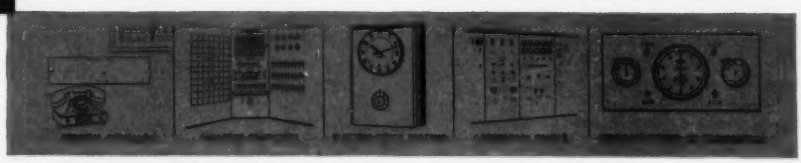
With a McIlroy Analyzer you can not only *pre-test* your long range plans for network expansion but analyze your immediate day-to-day problems. Think how this can prevent disastrous waste of engineering and construction time, of materials and labor that can easily run into millions!

Let us send you a list of McIlroy users.

That's why we say the cost of a McIlroy is only a drop in any budget

The STANDARD ELECTRIC TIME COMPANY

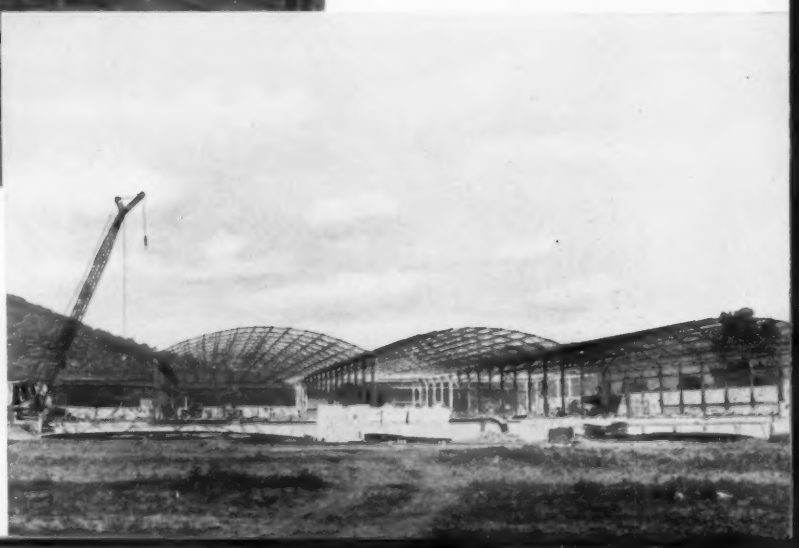
125 Logan Street
Springfield 2
Massachusetts



Building Bigger To Serve You Better

Dresser Manufacturing Meets Gas Industry Needs With Multimillion-Dollar Expansion Program

Steel worker secures roof girder in place on the new Dresser Manufacturing plant at Wellsboro, Pa. The new plant will be devoted to production of gas service fittings.



The big new Dresser Wellsboro plant is equipped with specially designed, high-speed, largely automatic production machinery.

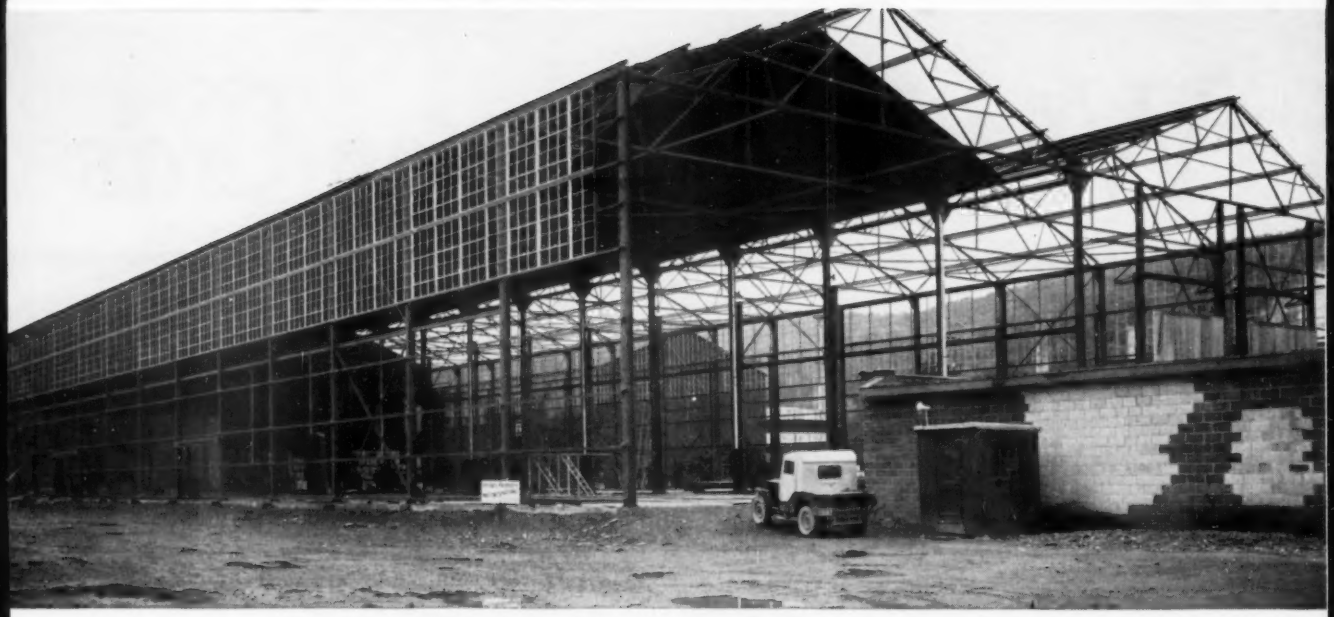
Gas is America's most wanted fuel. With new homes going up at the rate of more than a million a year and industry expanding at a $40 billion-a-year clip, our gas utilities can feel proud of doing a tremendous "growing job" to meet this need. As a company which has worked closely with the gas industry for 75 years, Dresser has naturally been expanding its facilities to better supply the quality pipe joining and repair products needed by the gas industry.

Dresser has more than doubled its plant size since World War II. At present, a large new addition to the Bradford plant is about ready to begin production. A completely new compression fittings plant is being outfitted at Wellsboro, Pa.

The Bradford addition will give Dresser a sizable increase in production capacity on the company's general line of couplings, clamps, sleeves, etc., plus manufacturing space for a number of new products now under development.

The new Wellsboro plant will be devoted to production of gas service line fittings used from the main to the meter. Modern production tools and methods will provide maximum efficiency and increased volume.

The wide and growing use of Dresser couplings, fittings and repair products throughout the gas industry can be credited to the time-proved reliability and dependability of the Dresser sealing

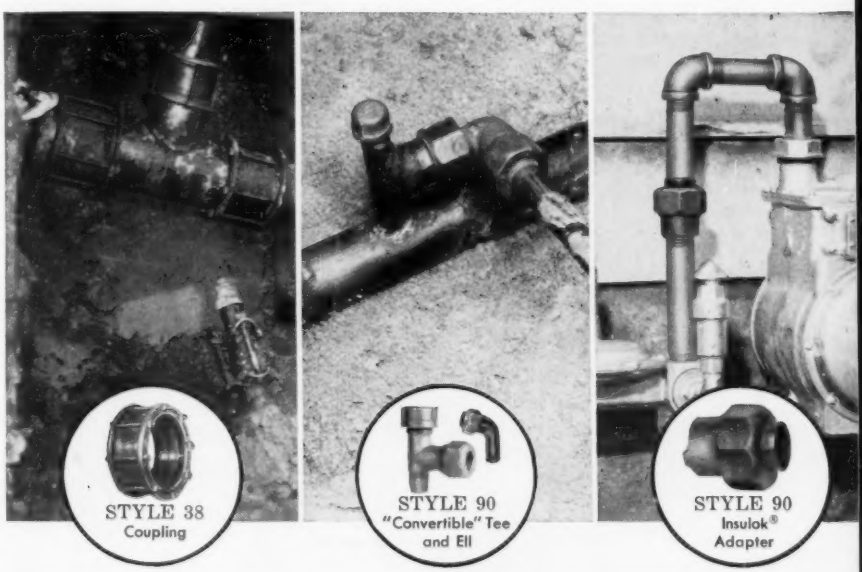


Big Dresser expansion program at the home plant in Bradford, Pa., will greatly increase production capacity for repair clamps and sleeves, saddles, and other products essential to the gas industry and many other industries that depend upon efficient piping.

principle. Also, since they speed and simplify pipe installation and maintenance, Dresser products have played their part in helping the gas industry do its job with speed and economy.

With Dresser products, a wrench is the only tool needed to make a perfect joint or permanent repair. Ordinary workmen can install them quickly and easily, even when working in a narrow trench or other cramped quarters.

You may look to Dresser, too, for a constant stream of new products and product improvements. Coupled with its big plant expansion, Dresser is enlarging its engineering and research facilities. All of this investment has but one aim: to make Dresser more and more a "*fitting partner for the gas industry*".



"*From main to flame*" is Dresser's way of describing the coupling job that Dresser's couplings and fittings do. Shown above, left to right, are actual installations: on the main, on the service line, and at the meter.

Write for your free copy of Dresser's illustrated 36-page catalog, *Dresser Fittings for Gas Service Connections*. Contains complete information on styles, sizes, dimensions, applications, and installation.

DRESSER®

ONE OF THE DRESSER INDUSTRIES

FITTING PARTNER FOR THE GAS INDUSTRY

DRESSER MANUFACTURING DIVISION, Bradford, Pa. Warehouses: Houston, S. San Francisco. Sales offices also in: New York, Philadelphia, Atlanta, Denver. In Canada: Toronto and Calgary.

What's Good for Gas

YOU'LL BE Happy AS A BRIDE AND GROOM
WHEN GAS
does the 7 big household services automatically
and keeps your home modern as tomorrow
GAS is modern, clean, dependable, fast, safe, silent and entirely automatic, for cooking, air conditioning, heating, clothes drying, refrigeration, water heating and incineration.
Your gas company cooperating with your architect, builder, heating contractor and appliance dealer will gladly tell you how economically GAS will modernize your home and bring you new comforts and conveniences.
IF YOU LIVE BEYOND THE GAS MAINS, ENJOY THE COMFORTS AND CONVENIENCES OF LP-GAS (BOTTLED OR TANK) FOR ALL 7 OF THE BIG HOUSEHOLD SERVICES
See Playhouse 90 on CBS-TV for local listings for time and station
Built-in GAS ovens, top burners and modern ranges cook entire meals automatically. Silent GAS refrigerators have fully automatic ice makers.
Compact automatic GAS heating units, air conditioners, water heaters, clothes dryers, incinerators give more space for living.
GAS is 7 ways better for the 7 big household services
How you can enjoy more comforts and conveniences with GAS is brought to your attention by these Suppliers to the Gas Industry:
American Cast Iron Pipe Co.
American Meter Co.
Bastian-Blessing Co.
Cleveland Trencher Co.
Fisher Governor Co.
E. F. Griffiths Co.
Rockwell Manufacturing Co.
M. B. Skinner Co.
Sprague Meter Co.
Superior Meter Co.
Subsidiary of Hoffman Meter Co.
U. S. Pipe and Foundry Co.
Vulcan Rubber Products
Division of Reeves Brothers, Inc.
Walworth Co.

FREE Mats of GEM advertisements for use in newspapers are available to make this program pay extra dividends for gas utilities and dealers.

is Good for You ...

Put Your Shoulder to the Wheel

As the Gas Industry goes, so will go the future of every man and woman serving it and every company that's part of it.

To make the most of present and future opportunities requires the utmost abilities, and the united efforts of every segment of the industry.

Now, for the third consecutive year, the Gas Equipment Manufacturers national advertising program is helping sell more gas for utilities and more appliances and equipment for dealers and manufacturers. The GEM Program has been an outstanding success.

Every Supplier to the Gas Industry is urged to support and profit by this Business Insurance Program.

For details, write to Gas Equipment Manufacturers Committee, c/o Gas Appliance Manufacturers Association, 60 East 42nd Street, New York 17, N. Y.

Ask these Sponsors of the GEM Program how you can participate and profit:

American Cast Iron Pipe Co.
American Meter Co.
Bastian-Blessing Co.
Cleveland Trencher Co.
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A. C. Lawrence Leather Co.
Rockwell Manufacturing Co.
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Vulcan Rubber Products
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Published As A Service To The Gas Industry By:

AMERICAN METER COMPANY
INCORPORATED ESTABLISHED 1836

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News about

B.F.Goodrich Chemical *raw materials*

Several manufacturers offer rigid vinyl pipe and fittings made from Geon. Sizes range from ¼ inch for instrument air lines up through 12 inches. Fittings are socket or threaded. Vinyl is normal or high impact.

with light-weight Geon rigid vinyl pipe...

two men can lay a mile pipeline in 8 hours

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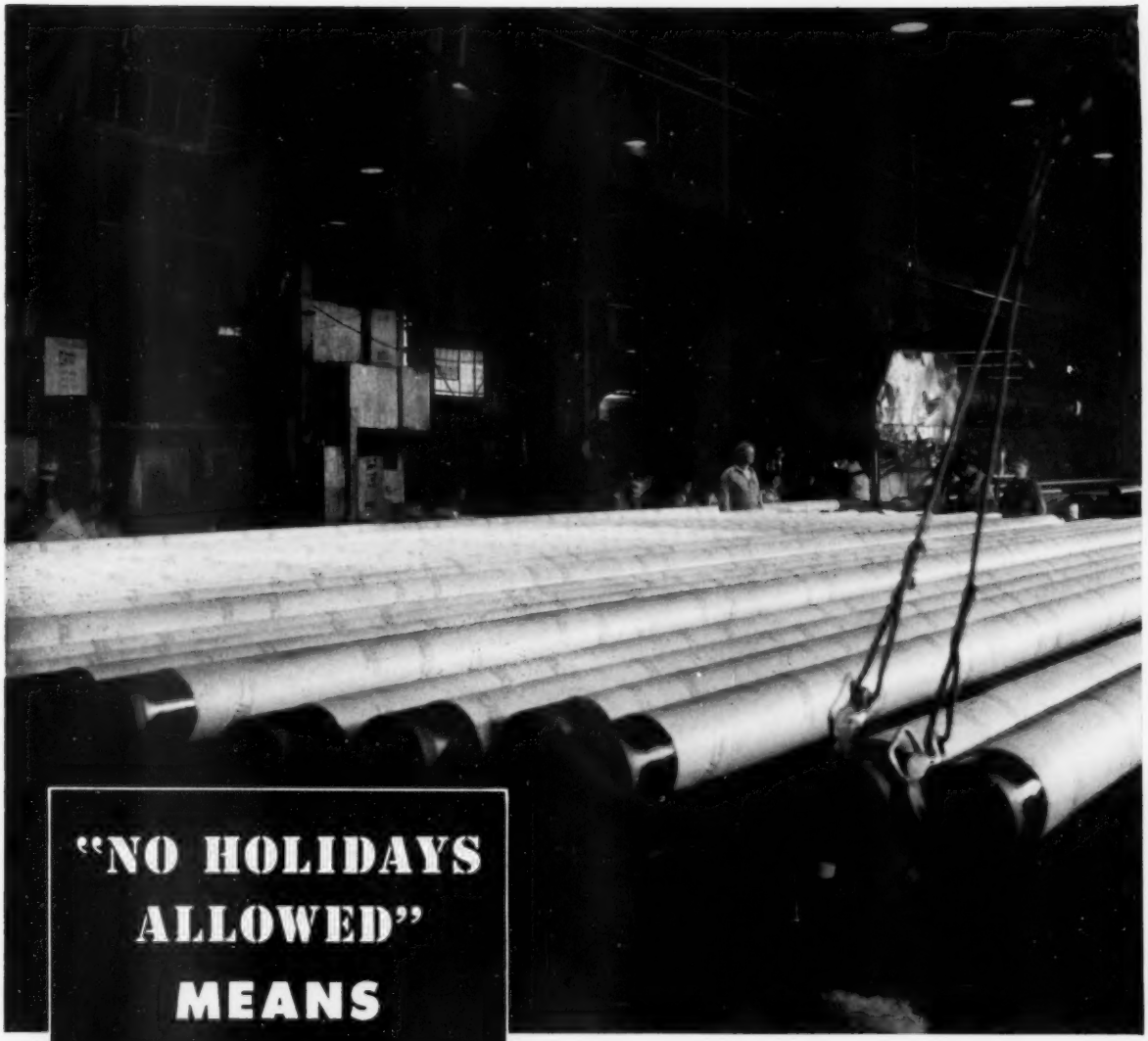

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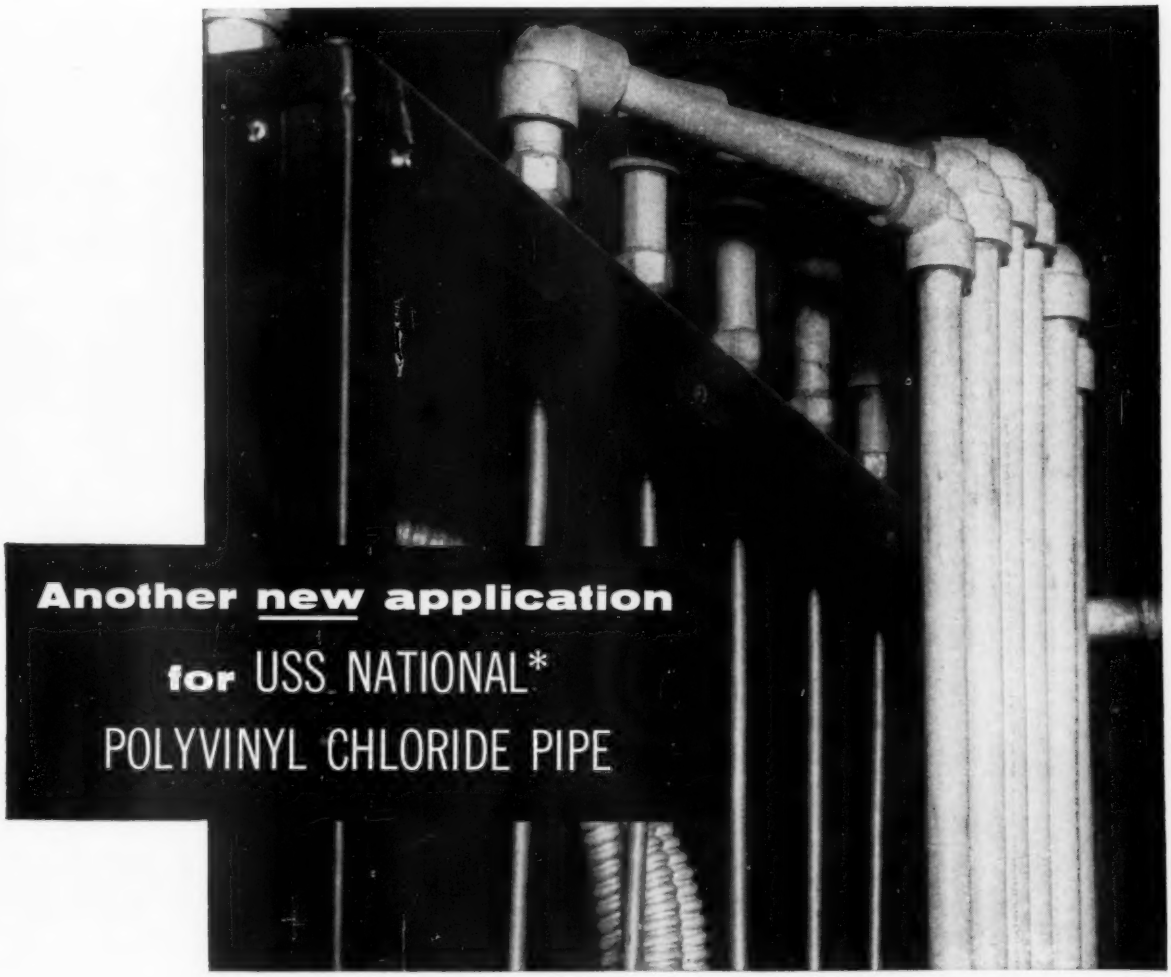

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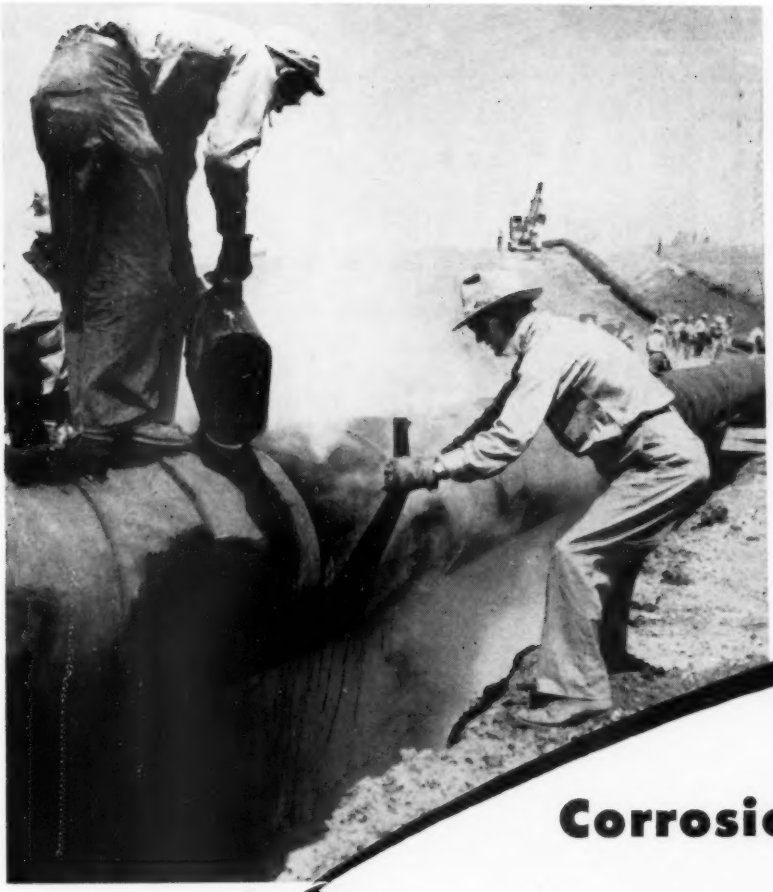
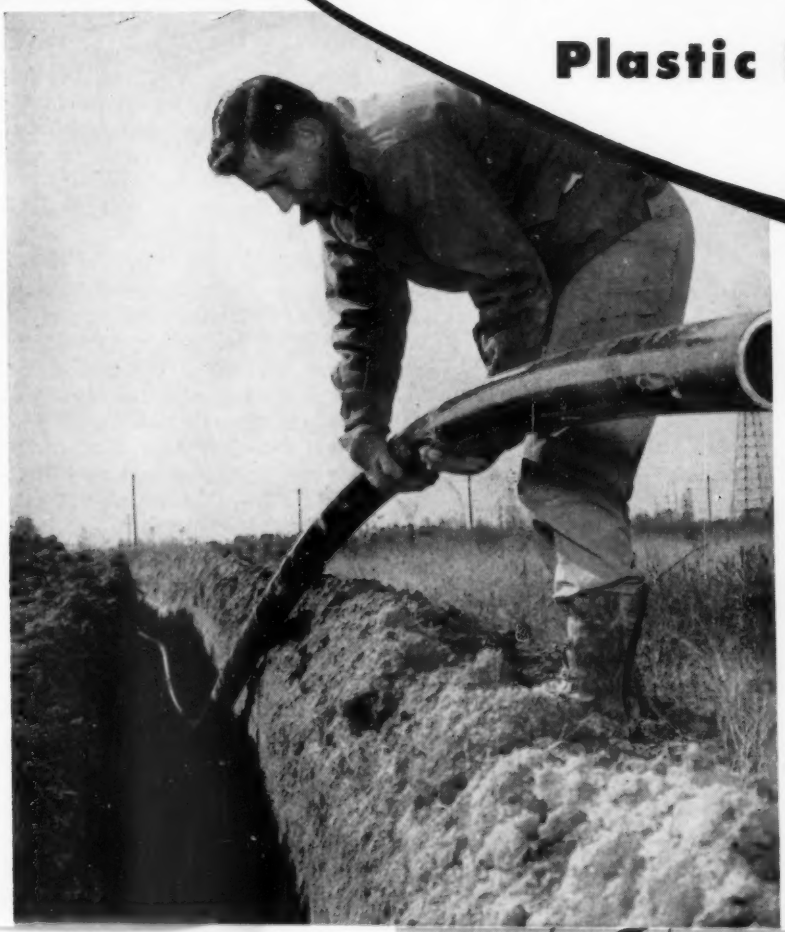


GAS

MARCH 1957

Corrosion Prevention and Plastic Pipe Section



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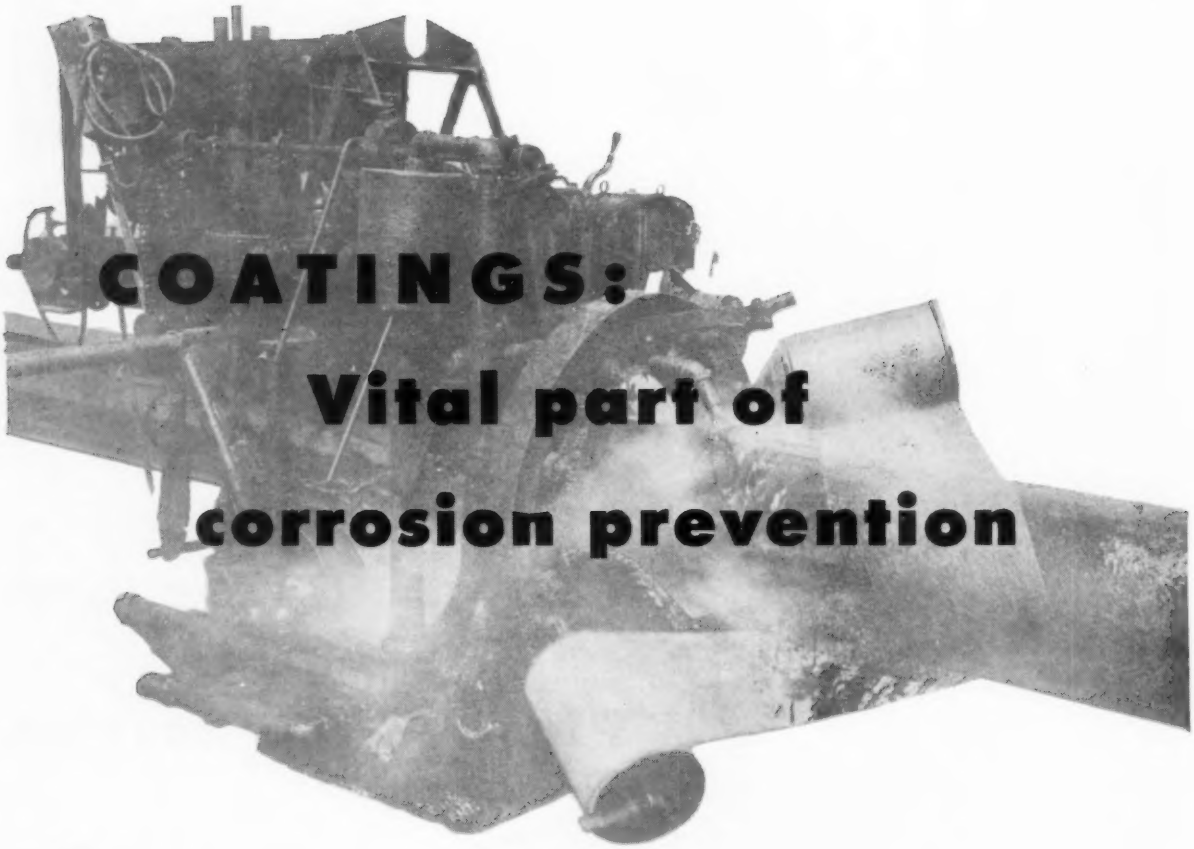


COATINGS: Vital part of corrosion prevention

GAS staff report

FROM the riser to the customers' meter installations all the way back to the wellhead, corrosion takes its toll on the underground metallic piping and other structures maintained by the gas industry. Operators of gas industry properties have two alternatives for reducing losses caused by corrosion: (1) use cast iron, plastic, or other piping with demonstrated resistance to corrosion inherent in the basic material, or (2) use a piping material that can be economically protected from corrosion by application of a protective coating and/or a cathodic protection system.

It is not news to anyone in the gas industry that steel and other pipe materials will readily corrode in certain soils. An engineering evaluation is usually necessary to determine just what protective measures are required to adequately mitigate corrosion under specific conditions. Usually, the answer is cathodic protection in the gas industry.

A cathodic protection system will furnish desirable corrosion prevention to bare steel pipe. However, experience over a long period of years has indicated and proven that the cost of applying additional protection in the form of a protective coating to bare pipe results in long-term savings many times over the initial cost of applying the coating.

Acceptance of the premise that protective coatings pay-out by augmenting the cathodic protection system applied to buried steel piping is widespread throughout the gas industry—both the distribution and transmission ends. The actual concept is that of a protective coating system working with a cathodic protection program. Each complements the other.

The two form a mutually supporting team to effectively mitigate corrosive factors. For most gas industry purposes, the use of one without the other is becoming relatively isolated. But, again, the basic criterion for corrosion mitigation measures in the gas industry are the specific, local conditions in every instance.

Many millions of dollars are spent by the gas industry on coatings for piping systems each year. These coating systems are a tool of the corrosion engineer and operating personnel. There are myriad types and kinds of coatings. However, there is no guide as to the best type or kind for a particular set of conditions. There is no panacea for the coating problems of all corrosion engineers in the gas industry.

It is probably this concept that has led to some purchasing of coating and wrapping materials based on price alone. It practice, coatings are specialized materials that should be engineered for specific jobs or applications.

Coating system

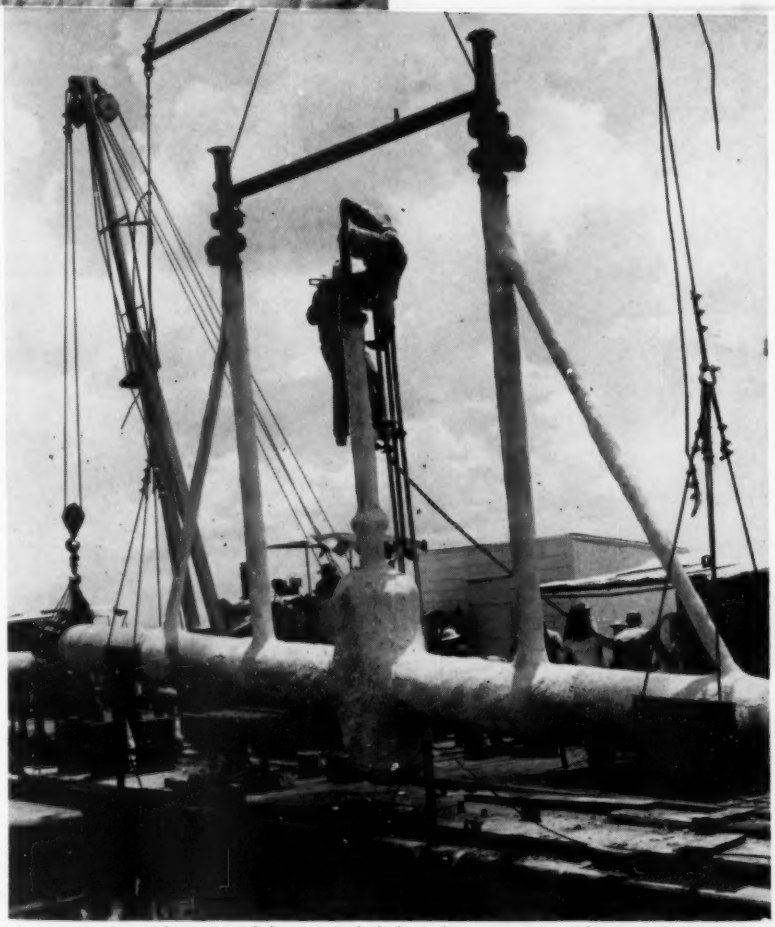
The general term coating as applied to gas industry piping involves a system. Such a system may be as simple or complex as you please. They have been years in developing.

Bituminous coatings were applied to underground steel before 1940. Since then, extensive experimentation in laboratories and field experience have resulted in many coating systems.

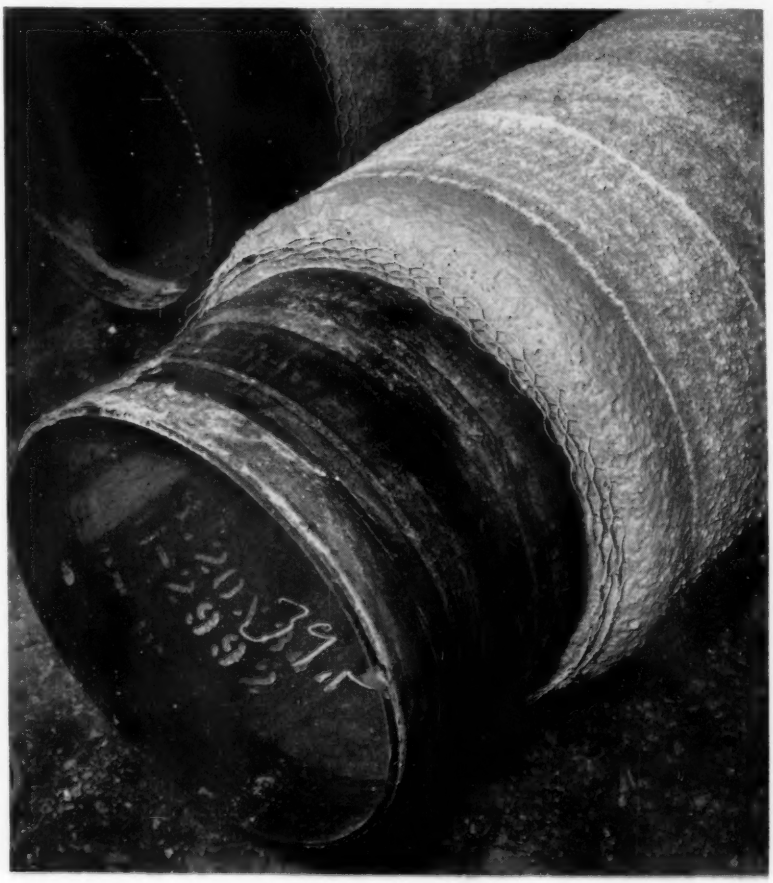
The prime purpose of gas line coating is to maintain a high coating resistance value over a long period of time. The ability of any coating to do this depends upon the care of application, handling of the pipe after application, coating components, and service conditions—among other things. Should a coating meet the stated requirement, the ultimate advantage is in reduced current requirements for cathodic protection over the expected long life of the steel pipe.

Cathodic protection current requirements are generally established in two ways: (1) the determination of coating resistance which results from observation of the instantaneous change in pipe-to-soil potential caused by the impressed or galvanic d-c current, and (2) the change in pipe-to-soil potential due to polarization resulting from current application to the coated system over a long period of time.

It is generally accepted that coat-



As America's pipeline network has expanded through swamps, to offshore, and under more and wider rivers, special coatings were developed to anchor the pipe in its marine setting.



More common, but still specialized, is the yard-applied enamel coating, reinforced with an appropriate material, and finally wrapped wth a rock shield.

ings will reduce the requirements for cathodic protection current, as compared to the current requirements for bare gas lines. But, over a period of time, soil stresses and general disintegration of the coating system may bring cathodic protection current requirements to values approaching or equalling those for bare steel pipe.

So, the long-term ability of a coating to withstand the rigors of mechanical stress and the chemical reactions of components of aggressive soils is as important as the initial resistance of the applied coating system. Similarly, the coating system that exhibits high initial resistance and shows by actual experience it can stand up under soil effects over a long period of time, is the most desirable.

One of the prime operations for the application of any coating material in a manner that will produce end results of an efficient coating system, is cleaning the surface to be coated. For over-the-ditch work, power-driven wire brushes and/or knife blades operated in a rasp-like manner have served well for a number of years. Such cleaning methods are satisfactory if performed on pipe that is in relatively good condition. On badly pitted pipe, for instance, another surface preparation method would be preferred.

Sand blasts are often used in coating yards for cleaning the surface of pipe down to bright steel. Other abrasives are also used, such as shot, steel grit, etc. In many cases, the power tool cleaning is specified as compliance with specification *No. SSPC-SP 3-52T Power Tool Cleaning*, of the Steel Structures Painting Council.

Welding scale, burrs, slag, rust, oil and grease, etc., must be removed from the surface to be coated. Good cleaning practice will enable the prime coat or coating material to effectively bond with the surface of the steel pipe.

The prime coat, in turn, prevents the cleaned steel surface of the pipe from atmospheric rusting and facilitates the bond of subsequent coating materials. Not all coating systems require a prime coat. The elimination of the prime coat is a major advantage gained from the use of some coating systems.

After the pipe has a coating system applied, handling directly affects the resulting performance of the coating - cathodic protection team. For yard-applied coating work, the stockpiling, shipment, and trans-shipment of the coated pipe, with attendant loading and unloading operations, are sources of damage to the treating and wrapping. For over - the - trench work, lowering-in and backfilling are damage sources—the latter is true for all applications.

The important factor is training crews to handle pipe to prevent damage to the protective system. It involves an awareness of what the coating is, its purpose, and a general understanding of corrosion prevention and the negative economy of having badly damaged pipe coatings.

In the ground, coated pipe is subjected to mechanical stresses calling for coating system deformation resistance. Deformation or cold-flow can cause holidays in relatively perfect coatings that were installed underground in this desirable condition. Sources are the static pressure of the soil cover, rocks, hard clays, tree roots, soil displacement, etc. The damage can be caused from light static-pressure loads that are experienced continuously over long periods of time or from relatively short periods under heavy loading.

Under optimum conditions, the trench bottom would be rounded out to fit the lower quarter section of the pipe. This would evenly distribute the pressure loading on the pipe after careful tamping of backfill. However, most gas pipelines and distribution mains are not installed in this manner. Rather, flat-bottomed trenches are specified. This means that the total weight of the pipe and soil above it

Various methods are used for application of special, high-aggregate weighting coatings. Upper right, a field welded joint is hand coated. To the right, a stationary yard machine applies a heavy pipeline coating continuously. Below, concrete coating is hand "gunned" on distribution company river crossing pipe.

The pressure-sensitive plastic tape coatings (above) have become significant factors in pipe protection. Large diameter mainline pipe is tape coated, as well as irregularly shaped fittings.

Field application of a specialized coating system for a stream crossing on a major natural gas pipeline (below).

are supported on a narrow strip of coating on the underside of the pipe. This greatly multiplies the expected static pressure loading. It is obvious that rock, foreign material, or an unlevel trench bottom would again multiply the loading.

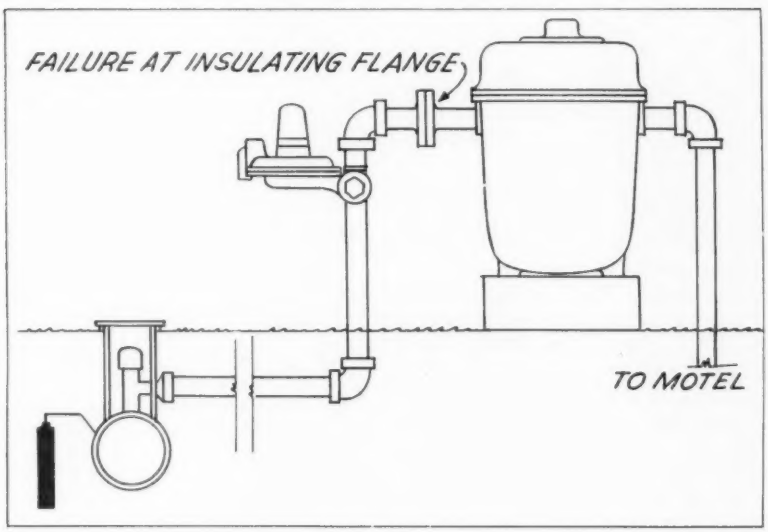
Other deformation to coatings on pipe under operating conditions in the gas industry result from moisture absorption and heat. Though most good coating systems today are essentially impervious to water, some moisture absorption is expected and influences the rate of deformation. Soil temperatures at gas main and pipeline depths seldom exceed 80°F; however, on the discharge side of a compressor station, temperatures in the range of 150 to 170°F may be developed. The temperature of the carrier pipe may remain over 100°F for 15 to 20 miles on downstream. This heat factor can contribute to underground coating deformation.

Some areas produce severe soil stress to buried pipe coatings. This results from expansion and contraction of some soil types under conditions of alternate wetting and drying. Coatings may suffer distortion as the masses of soil in which gas lines are imbedded can have high shrinkage characteristics that set up relatively large damaging forces. For some coating systems, shielding wraps are necessary in such soils.

Electro-chemical phenomena are associated with the underground condition of gas piping and coatings. Current requirements are related to polarization which is, in turn, related within limits by volume and migration of oxygen that reaches a pipe surface and film depositions on pipe surfaces resulting from current flow—to or from the steel. An underground metallic structure will be constantly collecting and discharging electric current. Some measure of a gas piping coating will be its ability to resist damage from various currents. Stray currents are a particular problem to the distribution system corrosion engineers, and it has been reported that long-distance gas transmission systems are affected by earth potentials developed from changes in the earth's magnetic field. ■

Accidental contacts in a distribution system

By JOHN EMERY, Assistant Superintendent of Distribution
Rio Grande Valley Gas Co., Brownsville, Texas



Case I.

AMONG the problems encountered in cathodically protecting distribution systems is the elimination of accidental contacts. And there are normally more problems in cathodic protection work involving distribution work than on transmission systems.

Cathodic protection was applied to our Brownsville gas system in 1955 and 1956 after a program of cathodic protection on 13 small distribution systems was begun in 1953. Brownsville, Texas, lies at the southern tip of Texas in a delta area built up by the Rio Grande river. It is a city of approximately 50,000, 7200 gas customers.

Soil resistivity in this area runs from 100 ohms to 5000 ohms with the average being in the neighborhood of 400 to 600 and permanent moisture lies within 15 ft of the surface in practically all cases.

The gas distribution system of Brownsville contains approximately 700,000 ft of 3-in. equivalent coated, wrapped, and welded steel pipe with numerous Dresser couples used at tie-in points.

All meters were insulated by the use of nylon bushings and magnesium anodes were individually installed on the mains. Most of the mains are in unpaved alleys and are accessible for such applications.

Using meter risers for test points, then, Dresser couples were bonded where necessary for metallic continuity and left unbonded when needed to isolate sections of piping.

During the course of applying cathodic protection to this system the following cases involving accidental contacts were dealt with:

Case I

An accidental contact was indicated in the vicinity of an intermediate pressure header along a state highway inside the city limits. Low pipe-to-soil readings in this vicinity indicated a contact of considerable magnitude.

Investigation of pipe-to-soil readings at meters in the vicinity indicated a failure of an insulting flange on a #2½ Emco meter serving a large motel. The lawn of this motel is irrigated from a private well and our gas distribution system was grounded or shorted to this well casing, draining protective current off at this point. Re-insulating this flange eliminated this contact.

Case II

In a residential area, an accidental contact was indicated on a short stretch of 2-in. L.P. main in a street. An unbounded Dresser coupler limited the current drain to a few hundred feet of pipe, and pipe-to-soil readings on an adjacent fire plug and on gas meters indicated the gas main was touching the water main, which also is located in the street.

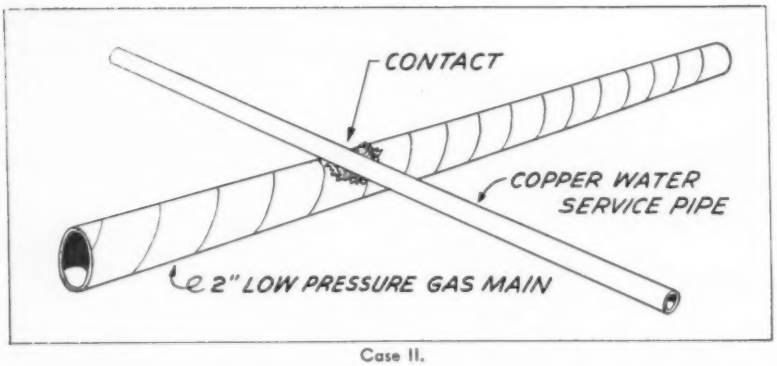
By setting the transmitter of a pipe locator on the gas line and following the line with the receiver we were able in a very short time to find a point at which the signal was lost in following the gas line from each side of the point.

The spot was then uncovered and disclosed that a new copper water service was crossing at this point and that city water department crews had broken the coating on the gas main and pulled the copper pipe into contact with the water system.

The two lines were separated and the gas line was re-coated here.

Case III

A residential area of some 15 blocks and fed from a single point was found to have bare metal in contact with the coated gas lines. This was indicated by pipe-to-soil readings of .74 after the applica-



Case II.

tion of magnesium.

A check was made of all points at which gas mains and water mains crossed, but a pipe locator indicated no contacts there. The uniformity of pipe-to-soil readings indicated that a large body of metal was in contact.

Since we could not tell where in the subdivision the contact might be, we started down the alleys following the gas line with a pipe locator receiver. In the second block we lost our signal at a service and examination of the setting showed an insulator had been bridged. An all-thread nipple had been pulled through a nylon bushing to the point that it was in contact with the core of the riser stop cock. Re-insulation of this setting brought potentials above one volt pipe-to-soil in this section.

Case IV

Case IV involved a contact which was draining cathodic protection current from a downtown area of many blocks.

In order to narrow the field of the hunt for this contact, we first unbonded several Dresser couplers until we narrowed the search to an area of some three blocks long and three blocks wide.

Then using our pipe locator as in previous hunts we first found a meter against a sheet metal building which was being shunted by the building and bridging the insulator. Rectifying this, however, still left us with a major contact. Following our mains with the locator we found an indicated short in a street intersection.

Excavation at this point showed that contractor, in laying a 10-in. cast iron water line, had literally squeezed the pipe between our 8-in. gas main and a concrete storm sewer making a very good contact between our coated pipe and the bare pipe.

In order to eliminate this contact, we used hydraulic jacks on our pipe to force it into a concave shape to pull it away from the bare pipe far enough to insert an insulating spacer. Elimination of this contact cost approximately $500.

Case V

In Case V a four-block area had a pipe-to-soil reading of .71 after application of magnesium to coated mains in a street which had recently been paved.

Investigation with a pipe locator indicated a contact in an intersection. Cutting the pavement and excavating at this point disclosed an old 2-in. galvanized water line over our 4-in. gas main and touching our line at this point. This was an old abandoned water line with no services off of it so contact with water lines was not indicated by P/S readings on water meters in this area.

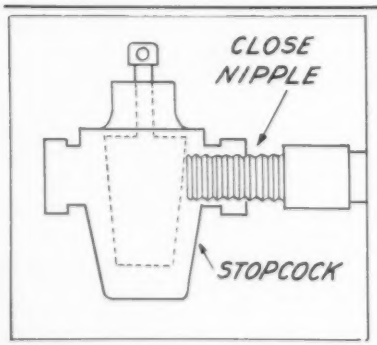
Pipe-to-soil readings on this 4-in. gas line rose to 1.11 volts after elimination of this contact.

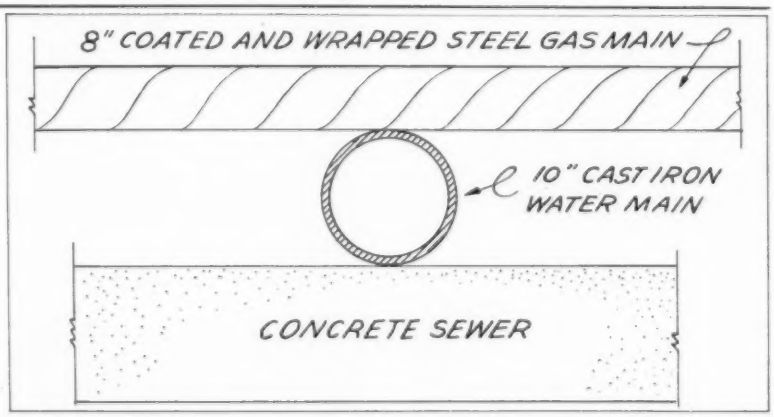
Case VI

Case VI involved a 15-block downtown area which had been under protection during the application of magnesium but which was found to have pipe-to-soil readings in the neighborhood of .71 upon rechecking the entire system. Since an insulation failure was indicated, visual inspection disclosed that an insulator on a domestic loop was being bridged by the yard line crossing the service riser. Re-building the customers line remedied this situation and brought pipe-to-soil readings up to above 1.00 volt in the area.

Conclusion

Of the six cases reported, three were a result of our negligence in insulating failures and three were due to a lack of understanding on the part of city employees and contractors involved in water line work. Education of employees of municipal water systems will eliminate most of the cases of the former type. ■

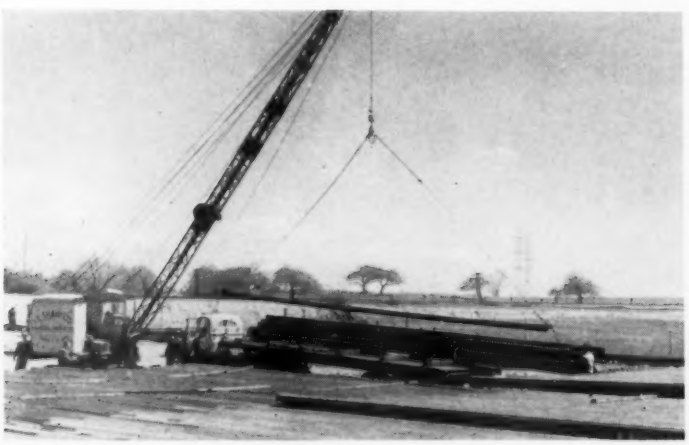




Case III (above).
Case IV (right).

CORROSION PREVENTION

Distribution company finds coating and wrapping pipe pays off

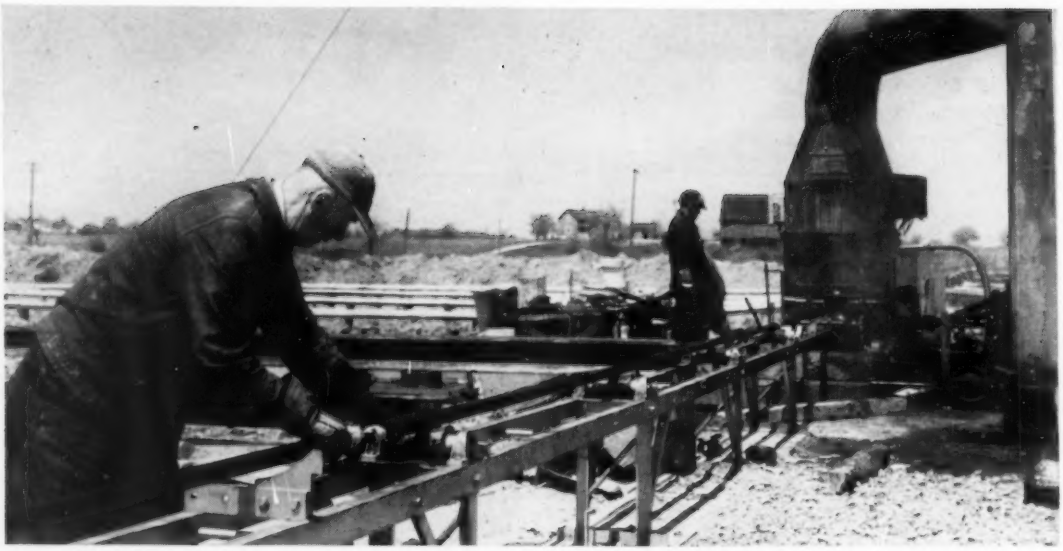


Union Gas has pipe shipped directly from the mill to a coating yard at Hannon, Ont., just outside of Hamilton. Here, a semi-trailer rig delivers bare pipe from the mill to stockpile in the coating yard. Gas company inspector keeps quantitative and dimensional control of incoming shipments.

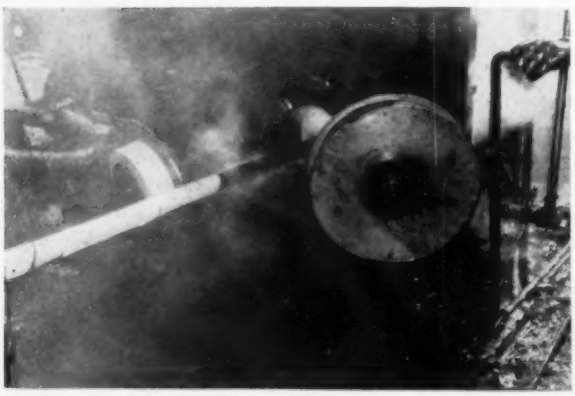
PRIOR to the spring of 1956, Union Gas Co. of Canada Ltd. was not using yard coating and wrapping for distribution piping because of the high cost resulting from not having a coating yard within economical distance from its operations. However, this company was aware of the additional serviceable life of coated and wrapped pipe as it has used field-applied hot coatings for years. Studies indicated hot-coated pipe can be operated for many years without appreciable deterioration or leakage in the soil encountered within its service area.

A coating yard was established at a point relatively central to Union's operating centers. This facility was completed in the spring of 1956. Since then, all sizes of pipe used by Union Gas are coated and wrapped in the yard. The only exception is pipe used for service lines installed within a customer's premises, and then only when non-corrosive soils are involved.

Fork truck is handling pipe in movement from receiving stockpile to coating and wrapping production line. Once in the cycle, pipe is moved by hand to prevent damage to newly applied coatings.

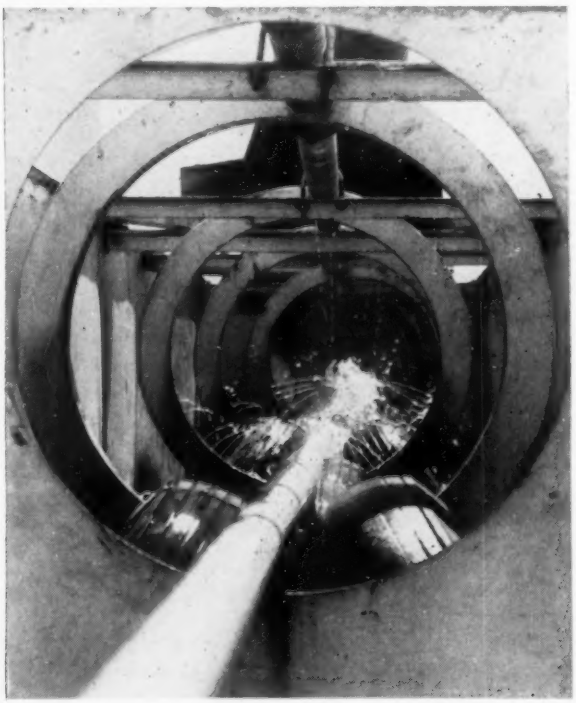


After being cleaned and primed, pipe is moved to the conveyor shown. Each length is coupled to a preceding joint by a double-male plug that contacts only the inside walls of the two lengths. Then, there is a continuous flow to the coating and wrapping machine (right background).



This coating machine applies a hot coal-tar, plasticized enamel to specified thickness over a thoroughly dried primer coat. As pipe leaves the coating machine (as it is shown doing above), a spiral wrap of fiberglass material is spun on the rotating, coated pipe. This wrap reinforces the unset enamel coating. For some runs, coal-tar saturated felt wrap is applied just after the fiberglass. In both cases, a final wrap of 80-lb kraft paper is put on to protect the coating and wrapping during handling.

After leaving the coating and wrapping machines, the protective coating is fed through a water bath (below). This cools the hot-applied coating material, tending to solidify it during warm weather. This prevents impairing the coating's efficiency during further handling.

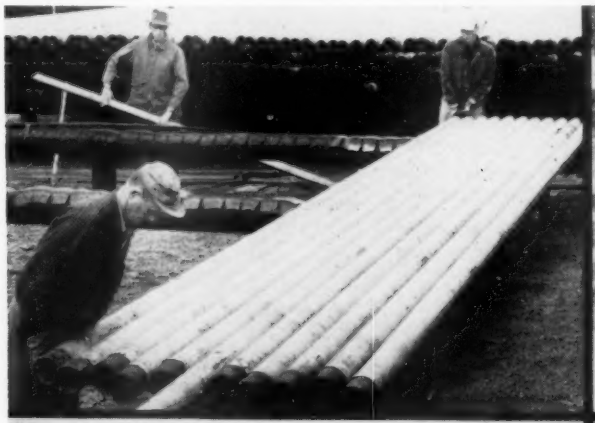


Union Gas Co.'s inspector (left) operates from the coating yard to tally pipe and maintain quantitative and qualitative control for the finished product.

Distribution company finds coating and wrapping pipe pays off

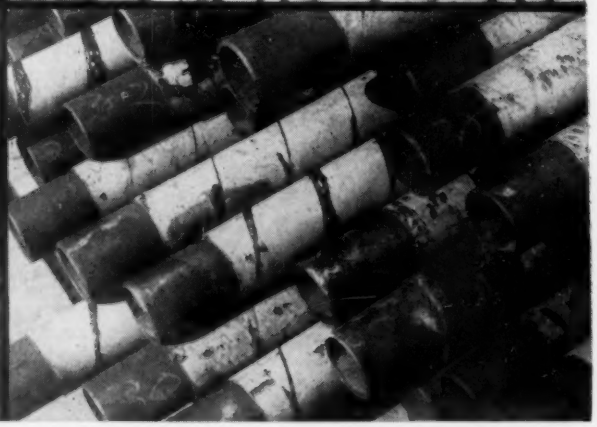
Here, coated and wrapped distribution pipe is delivered from the coating yard to the installation job-site. This operation saves money and is practiced whenever possible. Loading and unloading is done with care to prevent damage to the applied protective coatings.

When pipe must be stockpiled in the yard or at the distribution service center, racks are padded and pipe is handled to keep the coating continuous.



Heavy belting and excelsior padding are required when trucking coated and wrapped pipe from coating yard to gas company service center or installation point.

A shipment of coated and wrapped pipe arrives at a distribution service center. Storekeeper (foreground) checks and tallies each joint as it is unloaded from the truck. Pipe is tallied at each stage of shipment and trans-shipment.



Protective coating on pipe shown stockpiled at one of Union's distribution operating centers represents heavy investment over and above that for initial purchase of the pipe. However, the extra investment pays out in long service life.

Corrosion mitigation in congested areas

By F. E. KULMAN, Engineer
Consolidated Edison Co., New York

A SURVEY of corrosion mitigation practices by the AGA corrosion committee showed that, among gas distribution companies in the United States, 79 per cent of the mains are bare. At first glance, this figure would tend to make the city gas companies appear backward from the standpoint of taking steps to mitigate corrosion.

Yet, it was the city companies which, 40 or 50 years ago, saw the damaging results of corrosion on their mains and employed corrosion consultants to investigate and control the problem of electrolysis by stray railway currents from trolley lines and elevated structures. Much of the knowledge developed with respect to stray current electrolysis forms the basis for present corrosion surveys and mitigation practices.

Obviously, there are factors present in urban areas which influence the methods of construction and corrosion mitigation. The purpose of this article is to invite attention to some of these factors and to discuss some of the mitigation methods that have been found effective.

Congestion

One of the more important factors present in city areas is congestion — surface and underground congestion. It is known that when a repair has to be made on a pipe, in some areas of New York, it is necessary to dispense with excavating machinery, and sometimes even hand shovels, in order to get access to a pipe. The space under the street surface is occupied by rapid transit subways, sewers, steam mains, water and gas mains, telephone, railway and power cable conduits, as well as various other concrete and steel structures.

How does urban congestion affect distribution systems, as compared to cross-country transmission lines particularly in the matter of coatings and cathodic protection? The following is a partial answer. For example, congestion:

1. Reduces the clearance between gas pipes and other metallic structures.
2. Increases the probability of accidental contacts with other metallic structures.
3. Increases the probability of accidental damage to gas mains and their protective coatings caused by construction operations of others.
4. Favors the use of compression couplings for joining pipe, to permit the gas line to go around obstacles.
5. Increases the exposure to galvanic currents caused by the use of different metals in the various piping systems, and the presence of cinder beds in certain filled-in areas.
6. Increases the exposure to stray railway currents.

Stray currents

Always confronting the corrosion engineer is the presence of stray currents in the earth. From the corrosion standpoint, the large number of rapid transit subway and elevated lines must be designed and operated so as not to result in abnormal leakage of stray current. In New York there are more than 160 d-c railway substations supplying the rapid transit lines and railroads. The sum of the stray currents returning to these substations, estimated at 10,000 amp, is a very small part of the total railway load current. Nevertheless, corrosion engineers must be continuously aware of the presence of these currents and take the necessary precautions in designing and constructing underground systems to avoid stray current electrolysis. The fact that stray current electrolysis has been kept under control is the result of cooperative effort on the part of the pipe-owning companies.

This cooperation is fostered by the Greater New York Committee on Corrosion, composed of 24 organizations and companies operating underground metallic structures. This committee functions as a clearing house of information on underground corrosion.

Pipe materials

Cast iron pipe has been used and is being used for mains in the low pressure areas. From the corrosion standpoint, cast iron has given excellent performance. The expected life of cast iron mains is in the order of more than 50 years. The pipe is centrifugally cast in metal

and sand molds and the ends are plain for use with compression couplings in sizes from 6 in. to 24 in. Mechanically joint pipe is installed in sizes from 6 in. to 12 in. The service pipes in low pressure areas are uncoated steel.

Pipe in the high pressure and intermediate pressure mains is steel, assembled with compression couplings or welding.

Corrosion mitigation

The means available for electrolysis and corrosion mitigation are (1) insulating joints, (2) pipe coatings, and (3) cathodic protection. These will be discussed in the order named.

Insulating joints

Insulating joints have been used for approximately 40 years and have been found to be very useful for stray current electrolysis and corrosion control. They serve to break the electrical continuity of the pipe for stray currents and long line corrosion currents caused by major variations in soil conditions. No insulating joints have failed because of lightning surges or power cable fault currents. Furthermore, no need has been felt for protective spark gaps at insulating joint locations. In some cases these joints have developed leaks and where these have occurred they have been sealed by the use of catalytically cured resins applied to the joints.

Insulating joints are installed in mains at the property lines of gas plants, electric generating stations, and at bridge, river and tunnel crossings.

Insulating joints are installed at intervals of 2000 to 3000 ft to break the electrical continuity of the main for stray and long line currents.

Insulating joints are used in conjunction with cathodic protection to sectionalize the main into sections about 2000 to 3000 ft long. In case of accidental contact between a protected section and uncoated metallic structures, the loss of protection is confined to only one section of piping until repairs are made.

Our practice is to install insulating joints at the property line on all coated services to consumer's premises.

Insulating joints are installed at the property line on all services, coated and uncoated, to railway properties.

Coatings

Additions to the high pressure system have been made with coated pipe since 1937 and will continue to be made with coated pipe, both for mains and services. We use a double coat, double wrap, protective coating consisting of 2/32 in. of plasticized coal tar enamel, a wrapping of fiber glass, another application of enamel to 1/32-in. thickness, and a wrapping of asbestos felt.

Fittings on pipes larger than 4 in. are field coated with hot coal tar enamel. Welds and fittings on pipes smaller than 4 in. are field coated with a soft petrolatum compound and wrapped spirally with a protective tape. Alternatively, pressure sensitive tapes are used to coat the more simple fittings.

Except in a few cases described later we do not apply cathodic protection to the coated mains and services of the distribution network. We place reliance on good coatings. Construction specifications describe the methods of field coating welds, couplings, valves and other fittings for the more than 200 miles of coated main which have been installed during the past 10 years. The performance of the coal tar enamel coatings has been very satisfactory. For example, the leak records on 2-in. mains, which are particularly vulnerable to corrosion because of their small diameter and thin pipe wall, show that the coal tar coating has appreciably reduced the leak frequency until it is now comparable with the low frequency of leaks on the low pressure main system with its larger diameter pipes and thicker pipe walls.

Cathodic protection

Because of the proximity of other piping structures, the use of rectifiers and ground beds finds little application on a bare piping system. In designing a rectifier system great care must be given to the possible adverse effects of leakage currents from the ground bed to the pipes and cables of other companies.

However, controlled cathodic protection is used to protect some of the more important coated lines. In these applications, the pipes are provided with insulating joints as discussed above and the small amount of cathodic protection energy required to protect coated pipe is obtained from sacrificial anodes of magnesium alloy. Magnesium anodes are also installed on coated lines in the more corrosive soils. The protected lines are carefully tested biannually to assure that the cathodic protection is operating effectively. This adds to the maintenance expense but the added cost is easily justified for lines where continuity of service is necessary.

Similarly, two large regulator stations recently installed underground in gas plants have been provided with cathodic protection using magnesium anodes in association with coatings and insulating joints.

When cathodic protection is installed it is necessary to install bonds across the compression couplings to assure positive electrical continuity. Contacts between the gas piping and other piping should be avoided at all times. Check tests have shown that occasionally buried coated pipes have come into accidental contact with bare metallic structures even when utmost care was taken to prevent such occurrence. This has required the breaking of pavement and excavation of the pipes to clear the contacts.

Summary of practices

As a rule we use cast-iron pipes for the low pressure distribution mains, and we use bare steel for low pressure services. The expected pipe life is relatively long because the soils are generally not corrosive. In local areas, where corrosive soils are found, coated steel is used for low pressure mains, supplemented by cathodic protection, if necessary.

We rely on coatings for the high pressure mains and services, and in a few corrosive areas supplement the coating with cathodic protection supplied by magnesium anodes.

Important mains are installed with coatings and cathodic protection.

We find insulating joints very effective in mitigating stray current electrolysis, corrosion by long line currents, and galvanic action caused by dissimilar metals. ■

PLASTIC PIPE

1956 was record year for use of plastic pipe

By DON WRIGHT • Managing Editor

MORE plastic pipe was used in 1956 than ever before in the gas industry, results of *GAS'* plastic pipe survey indicate.

Last year 669,954 ft of plastic piping was installed by gas companies—nearly all of it on an operational basis. Last year's total footage topped the previous high of 510,964 ft, set in 1955, by 158,990 ft.

Today, more than 2 million ft of plastic pipe is being used in the gas industry. Nearly 1.2 million ft of this total was installed during the past two years, showing a definite trend toward acceptance of plastic pipe.

To get a cross-section of industry opinion on the present and future use of plastic pipe in the gas industry, *GAS* questioned 215 distribution companies throughout the U. S. and Canada. Sixty-six of the companies who participated in the survey—the sixth such study conducted by *GAS*—reported they had installed plastic pipe in their systems on operation or experimental basis by the end of 1956.

Twenty-five of the 66 companies who have made plastic pipe installations are using it on an operational basis (see *Table 1*). Of these 25 companies, 23 made plastic pipe installations last year. And all 23 intend to keep on installing plastic pipe this year—21 on an increased basis, and the two others on the same rate as 1956.

The 41 companies classed as experimental users of plastic pipe are shown in *Table 2*. Seven of these companies made experimental installations in 1956, the others prior to 1956. Ten of these experimental users have plastic pipe installations in their plans for this year—all 10 will install increased footage of the material in 1957. Two other companies on this list are currently making engineering and economic evaluation of their plastics programs.

GAS staff report

Eight companies who have had no previous experience with plastic pipe will begin installing this year on experimental basis.

This brings to 41 the number of gas distribution companies who plan to use plastic pipe in some form or fashion this year. Undoubtedly, several companies who were unable to participate in the survey also will begin experimental work on plastic pipe during 1957.

Most of the 36 companies who installed plastic pipe prior to 1956, but not in 1956, are still watching and evaluating their installations. A few of them—mainly companies who either distribute manufactured gas or peak shave with it—have ruled out the use of plastics for the future, at least until the time comes that they distribute natural gas exclusively, or the plastic pipe manufacturers come up with a product that will not be adversely affected by constituents of certain manufactured gas.

Other companies which have had limited experimental experience with plastic pipe or tubing are optimistic about its future, but are reluctant to pioneer its use operationally in their geographical areas. One such company expresses itself this way: "We feel that plastic pipe will take over a good portion of the steel distribution pipe, but we are reluctant to pioneer in this part of the country." This company is located in an area subject to severe winters.

On the other hand, many companies who have done much of the pioneering work with plastic material are now completely sold on it. One company which has been a steady plastic pipe user for several years reports: "There is every reason to believe that the use of plastic pipe in our operations will increase rather than decrease in 1957. We plan to continue to replace gas service pipe by the insertion of plastic pipe through the old steel pipe whenever possible, and to continue the use of plastic pipe for new customer service installations on a limited and selective basis."

GAS asked each of the 66 experienced companies: Do you consider plastic piping successful from an operating point of view?

Thirty eight companies said yes, although some of them limited these affirmative answers to certain operating conditions.

Four said no.

Fourteen said they have not had

Table 1. Distribution Companies Who Have Installed Plastic Pipe on an Operational Basis.

Company	Services		Mains		Max. Pressure	Type of Pipe
	New	Replace/insert	New	Replace/insert		
Arizona Public Service Co., Phoenix	●	●	..	..	30 psig	Kraloy—Type O
Arkansas-Missouri Power Co., Blytheville, Ark.	●	..	●	..	25	Carlon polyethylene, polyvinyl
Avalon Gas Dept., Avalon, Calif.	●	●	●	●	6-oz./in. (Propane-air)	Tenite II
Battle Creek (Mich.) Gas Co.	..	●	..	..	30 psig	Anesite 408
Cheyenne (Wyo.) Light, Fuel & Power Co.	..	●	..	..	15 psig	Carlon, Republic Steel, Tenite II, cellulose acetate butyrate
Consolidated Gas Utilities Corp., Wichita, Kan.	..	●	..	..	6 psig	Southwestern Plastics Tenite II, cellulose acetate butyrate
Fort Smith (Ark.) Gas Corp.	..	●	..	..	25 psig	Kraloy D, polyvinyl chloride
Gas Service Co., Kansas City, Mo.	..	●	..	..	35 psig	Yardley cellulose acetate butyrate
Louisville (Ky.) Gas & Electric Dept.	●	..	..	..	20 psig	Yardley butyrate, Mills II
Milwaukee (Wis.) Gas Light Co.	..	●	..	●	2 psig	Perfex—Tenite II
Nevada Southern Gas Co., Las Vegas, Nev.	●	..	..	..	30 psig	Kraloy polyvinyl chloride
Northern Indiana Public Service, Hammond, Ind.	..	●	..	..	8-in. wc	Anesite, Tenite II
Pacific Gas & Electric Co., San Francisco	●	..	..	..	50 psig	Tenite II, type 205, hard
Palo Alto (Calif.) Gas Dept.	●	●	●	..	15 psig	Amco-Kraloy, Kralastic, Tenite II
Peoples Gas Light & Coke Co., Chicago	..	●	..	..	6-in wc	Tenite II, cellulose acetate butyrate, Perfex 2055, Anesite 408 clear
Public Service Co. of Colorado, Denver	●	●	..	..	15 psig	Republic Steel, Carlon Tenite II (435, medium hard)
Pueblo (Colo.) Gas & Fuel Co.	..	●	..	..	15 psig	Tenite II (268)
Southern California Gas Co., Los Angeles	●	●	●	●	60 psig	Tenite II
Southern Counties Gas Co., Los Angeles	●	●	●	●	60 psig	Tenite II
Southwest Gas Corp., Barstow, Calif.	●	..	..	..	30 psig	Kraloy polyvinyl chloride
Southwestern Public Service Co., Amarillo, Texas	..	●	..	..	10 psig	Crescent Plastics, Tenite II Cresline butyrate
Springfield (Mo.) Gas Dept.	..	●	..	..	100-in wc	Kraloy, Tenite II
Tucson (Ariz.) Gas, Electric Light & Power Co.	●	●	●	●	60 psig	Carlon acrylonitrile modified Kralastic
Wisconsin Public Service Corp., Oshkosh, Wis.	..	..	..	●	5 psig	Busada 460, medium hard
Wyoming Gas Co., Basin, Wyo.	..	●	..	●	25 psig	Cozad flexible

TABLE 2. DISTRIBUTION COMPANIES WHO HAVE MADE EXPERIMENTAL INSTALLATIONS OF PLASTIC PIPE.

Alabama Gas Corp., Birmingham
Brooklyn (N. Y.) Borough Gas Co.
Central Electric & Gas Co., Lincoln, Neb.
Central Indiana Gas Co., Muncie, Ind.
Central Louisiana Electric Co. Inc., Lafayette, La.
Cincinnati (Ohio) Gas & Electric Co.
Citizens Gas & Coke Utility, Indianapolis, Ind.
Consolidated Edison Co. of New York
Consumers Gas Co., Toronto, Ont.
Corpus Christi (Texas) Gas Dept.
Equitable Gas Co., Pittsburgh
Gas Light Co. of Columbus, Columbus, Ga.
Gas Service, Inc., Nashua, N. H.
Kings County Lighting Co., Brooklyn
Laclede Gas Co., St. Louis, Mo.
Lone Star Gas Co., Dallas
Long Beach (Calif.) Gas Dept.
Michigan Consolidated Gas Co., Detroit
Minneapolis (Minn.) Gas Co.
Mississippi Valley Gas Co., Jackson, Miss.
Mountain Fuel Supply Co., Salt Lake City, Utah
New Jersey Natural Gas Co., Asbury Park, N. J.
New Orleans (La.) Public Service Inc.
Niagara Mohawk Power Corp., Syracuse, N. Y.
Northwestern Utilities Ltd., Edmonton, Alberta
Northwestern Public Service Co., Huron, S. D.
Ohio Fuel Gas Co., Columbus, Ohio
Peoples Natural Gas Co., Pittsburgh
Peoples Water & Gas Co., Miami Beach, Fla.
Pioneer Natural Gas Co., Amarillo, Texas
Rio Grande Valley Gas Co., Brownsville, Texas
Roanoke (Va.) Gas Co.
Rochester (N. Y.) Gas & Electric Corp.
San Diego (Calif.) Gas & Electric Co.
Southern Union Gas Co., Dallas
United Gas Corp., Houston
Washington (D. C.) Gas Light Co.
Western Kentucky Gas Co., Owensboro, Ky.
West Tennessee Gas Co., Jackson, Tenn.
Willmut Gas & Oil Co., Hattiesburg, Miss.
Wisconsin Power & Light Co., Madison, Wis.

enough experience to give an opinion either way. Ten had no comment to make.

Some of the companies made their "yes" answers conditionally. Here are some of their comments regarding the limitations.

"Yes. However, care must be taken with 2-in. and smaller plastic to insure a more uniform and compact base to avoid sags."

"Only for insertion in existing services and mains."

"Yes. However, side main connections cannot be made without shutdown so main installations are limited to self-contained subdivisions."

"For inserting in existing services, yes."

"Yes, it expedites service replacement and road crossings."

The companies who said they did not consider plastic pipe successful from an operating standpoint had the following comments:

"Since we manufacture oil gas with resulting light oil vapors, we found no plastics that would give satisfactory service."

"No, due to peak shaving gases."

Only one of the four negative answers came from a company whose system handles natural gas exclusively. One of the other three uses manufactured exclusively, the other two peak shave with oil gas.

It is also apparent, from comments made by companies questioned, that many distribution companies are interested in what others are thinking and doing concerning plastic pipe.

Here are a few comments.

"We do not use plastic pipe at this time, but we are interested in gaining information on its use."

"We are watching the operation of some plastic pipe on other systems very carefully. Have not yet reached a decision."

"Will wait to see what experience larger companies have with plastic pipe."

"At present we have not used, and have no immediate plans for using plastic pipe. We are, however, interested in knowing of experiences of others and new developments."

"We have never used any plastic pipe, however we have been watching and plan to continue watching its development. To date we are convinced that in presently known forms, plastic pipe is not acceptable for use with a gas containing aromatic hydrocarbons."

GAS' survey also revealed that 149 of the companies contacted had made no plastic pipe installations of any type prior to Jan. 1, 1957. Eight of these companies intend to do some experimenting this year.

Most of the 141 remaining companies had little or nothing to say about their reasons for not using plastic pipe. However, a few did—and most of them dwelt on the same point:

"We have manufactured gas in our gas properties. The condensates from the gas have a softening effect on plastic pipe, which makes this material unsuitable for our use."

"Do not plan to use plastic pipe at present, due to manufacture of high Btu oil gas in winter months. Light oils in suspension have adverse effect on plastic."

"We have not used plastic pipe and do not expect to use it in the foreseeable future as we shave with oil gas."

A company located in a cold winter climate area raises another objection to present-day plastic pipe. The general superintendent of this company says that frost sometimes reaches the mains during severe winters. Because of this, the company does "not intend to use plastic until it shows better resistance to frost." However, he also says, "I do believe plastic may be suitable some day." ■

Fig. 1. Typical trenching for plastic pipe in Las Vegas. Note soil characteristics.

Nevada Southern uses plastic pipe for new services

GAS exclusive

By J. FRED EBDON • Editor

THE operating territory of Nevada Southern Gas Co.—in the cities of Las Vegas, North Las Vegas, Whitney, Paradise and Winchester, in Nevada, plus the Nellis Air Force Base—is in dry, desert areas where a crust of caliche covers a generally stony soil. Sodium nitrate ($NaNO_3$), calcium carbonate ($CaCO_3$) and other salts make this soil particularly corrosive to buried metallic pipe.

Headquarters for Nevada Southern is in Las Vegas. This city is best known for its glamor; however, the encircling area is rich in natural resources that supply raw materials to industry which processes and manufactures numerous chemical and metal products. Las Vegas is the center of this industry and is growing in relation to development of these resources—principally, gypsum and limestone.

As the distribution system has grown, the use of plastic piping for service line construction has come into its own for this arid, desert location. About 8000 new plastic services have been installed in Las Vegas alone. This is approximately 90 per cent of the total service lines that Nevada Southern operates in that city. The distribution company's engineers estimate the average construction cost of a plastic service line to be about one-half of that for steel.

Since plastic pipe is used for new services and the distribution system itself is relatively new, the plastic service lines are installed bare rather than inserted in old, leaking metallic service lines, as is the case with some of the older distribution companies.

Company standards specify a minimum of 24-in. cover for the plastic service piping. Usually, the cover is caliche. The nature of this mineral at a typical new subdivision in Las Vegas is shown in *Fig. 1*. It is hard to make trench in caliche. Clay spades and moil points on a pneumatic hammer are required to break it up. A helper with a spade follows along and crumbs out the trench with a hand spade.

Nevada Southern brings in a truck (see *Fig.* 2) when installing the plastic service lines for a new tract of houses. The truck has a bed-mounted air compressor and tows another portable air compressor to the job site so that two crews can work with pneumatically powered tools. Gas welding equipment, line stopper and pressure control equipment, safety equipment, pipe, fittings, and the many hand tools and devices for complete service line installation work are carried on this vehicle. The truck has mobile VHF radio units for quick communication between the field location and the distribution service center or the main office building.

The plastic pipe used by Nevada Southern is Kraloy polyvinyl chloride type. As extruded, it is semiflexible and nontransparent. Polyvinyl chloride has a remarkable resistance to most inorganic acids, alkalis and organic solvents. Ketones, tetrahydrofurane, and similar solvents, will dissolve it. Pipe made from plasticized PVC has good mechanical strength (though less than that for steel pipe). The coefficient of expansion is relatively large.

When installed in rocky soil, Nevada Southern's program specifies a heavier wall. They require snaking the pipe in the trench to produce adequate slack. Service lines are run from 3 to 5 ft from the property line to prevent structures being constructed over them. No customer meter risers or services are permitted to be made under houses.

Nevada Southern has had no important trouble with the installation of plastic pipe for service lines. Incipient failures (few and far between) have been traced back in nearly all cases to plain carelessness—a problem that affects installation of any type of piping. Training and proper supervision have virtually eliminated this small vexation.

There have been mechanical digging breaks experienced, though only to a minor extent. Frequency is about the same as is generally expected when metallic pipe is installed. Management feels that even if the frequency of digging breaks to plastic service lines slightly exceeds that for metallic material, the fact that metallic service lines corrode rapidly (in from one to five years) more than offsets this meager problem. ■

Fig. 2. Nevada Southern truck equipped for installing plastic pipe.

Here's Nevada Southern's technique for installing plastic pipe . . .

Fig. 3. A Dressen (mechanical) coupling outlet tee is welded to the steel main. An extra-long metallic stiffener is inserted into the mouth of the plastic pipe. The reinforced end of the plastic piping is inserted into the Dresser outlet of the service tee, and the coupling is tightened. When the service line is ready to be put into operation, the main is mechanically tapped using equipment that prevents the escape of any natural gas. As can be seen, protective coating is applied to the metallic main and service tee. Extra precaution is taken to backfill and tamp the bell hole to support the plastic across the bell hole to service ditch.

Fig. 4. Some, but not excessive, slack is provided as the run of plastic pipe for the service line is made. The plastic pipe is laid bare in this extremely corrosive type of soil.

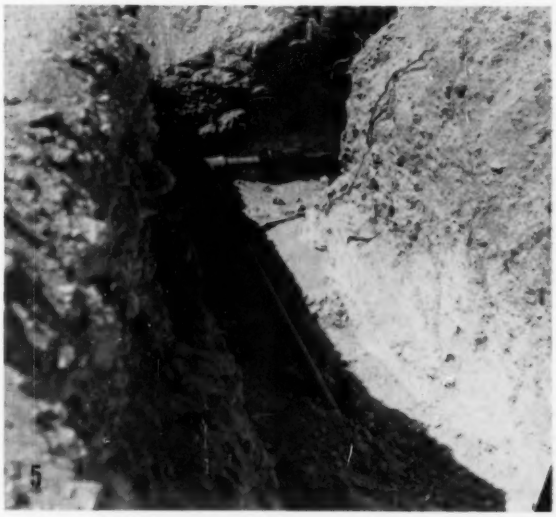


Fig. 5. The usual practice is to run the service line 3 to 5 ft from the line, thence by right angle to meter location. This insures adequate provision for expansion and contraction of the plastic pipe. PVC solvent-welded ells are used to make bends in the plastic piping.

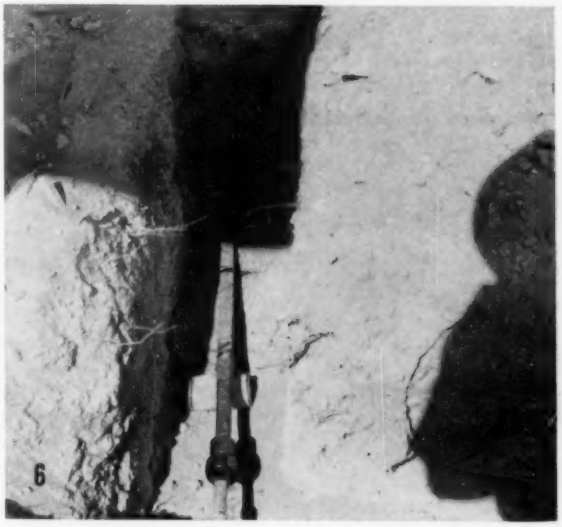
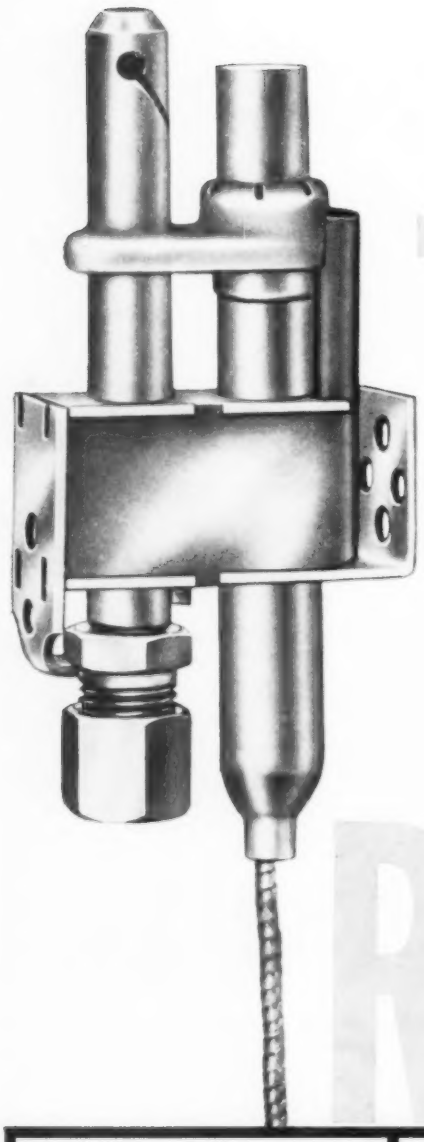


Fig. 6. Plastic service line pipe is fitted with another reinforcing sleeve at the terminal end and joined with the riser assembly with a half Dresser-coupling. The meter riser assemblies are prefabricated and coated and wrapped at the company's distribution service center.



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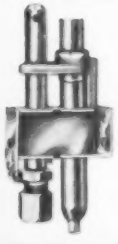

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Use of thermo-plastic pipe for gas distribution

By C. H. WEBBER, Vice President, Gas Operations
Tucson (Ariz.) Gas, Electric Light & Power Co.

PRIMARILY, a gas distribution system has one purpose, to deliver a highly elusive product to the consumer's premises in a safe and economical manner.

Underground piping, which constitutes the major portion of any system, therefore becomes most important.

No one will argue as to steel having the greatest strength of any material now used for underground piping, yet steel is not immune to damage under certain conditions. It can be ruptured by heavy construction equipment such as ditching machines, backhoes, rippers, etc. Yet, sometimes the strength of steel is its weakness, as it may be hit at some location and pulled apart or ruptured at some other point, possibly adjacent to some building, allowing gas to escape. Steel is also subject to the corrosive action of the soil, and if not properly protected, will develop leaks which would result in a hazardous situation.

On the other hand, all thermoplastic material available at the present time, which can be used for underground piping, is subject to damage to a far greater extent than steel; however, if a plastic pipe is hit, it will rupture at that point, and its condition is evident immediately and proper repairs can be made at the point of rupture. Being generally immune to the corrosive action of the soil, no leaks will occur, thus eliminating one of the most insidious operating hazards. Its use, at present, is limited to pressures not exceeding 60 psi because of economics. Unless properly installed, with great care, certain strains and/or stresses will result, which at some future time might cause rupture. Its location underground cannot be determined by a pipe locator, unless paralleled with copper wire.

The spiralling cost of steel pipe has reached the point where its use should be sharply scrutinized as to whether, in certain cases, it is justified, or whether some other cheaper material can be substituted. Where four years ago, plastic was a premium material, costs today are reversed. As an example, at local levels ¾-in. standard steel pipe wrapped, costs $.18 per foot; plastic pipe of the same size conforming to recommended specifications of the subcommittee of AGA costs $.145 per foot. Correspondingly, 2-in. wrapped steel costs $.43 per foot as against $.33 per foot for plastic, the latter representing a saving of 23 per cent. To this can be added a pronounced saving in installation costs. Plastic pipe loses price advantages in larger sizes due to increased wall thickness. As an example, 4-in. steel pipe, having a wall thickness of .188-in. costs $1.05 per foot wrapped, as against $1.12 for plastic. However, the usual lower costs of installing plastic still prevails.

Care *must* be taken in installing thermo-plastic pipe to see that the completed job is free from all installation stresses and strains. Definitely, great care must be taken to see that all pipe and fittings be joined without forcing or bending, thus eliminating any possibility of creating a continuing stress which might eventually result in a fracture of the pipe or fitting. Of equal importance, is to see that pipe and fitting rest on a firm dirt foundation. The greatest hazard exists where plastic services join the steel or plastic main, and in other locations where bell holes are necessary, requiring the removal of earth underneath the pipe. When such conditions exist, the plastic pipe should be blocked up in such a manner that the backfilling operation will result in an even dirt load over the entire length of pipe, thus eliminating any chance of shearing. Experience has definitely proven that practically all underground plastic failures have been due to improper footings.

Realizing the fragility of thermoplastic pipe, other precautions can be taken to protect it from damage. As stated above, the most vulnerable weakness exists at the point where the plastic service joins the steel, or plastic main, through the service tee. When the main and service fitting are steel, it is recommended that a short length of steel service pipe be welded to the service fitting, thus placing the compression fitting at a point where the plastic service pipe will have a firm foundation.

When the main and service fitting are plastic, a liner should be inserted in the plastic service pipe of sufficient length to internally reinforce the plastic, from a point at the plastic service fitting to a point where the plastic service pipe is on firm soil. This might be a distance of from 6 in. to two ft. Standard ½-in. pipe can be used as an insert, as its OD is .84 in. and the ID of the plastic is .87 in. This overcomes any possibility of rupture or shearing of the service. It is assumed that operating pressures are such that restricting the flow of gas for a short distance will not result in any disturbing line pressure loss.

Perhaps the most important part that plastic pipe can play in the distribution system is in locations where soils are highly corrosive to steel and particularly where proper cathodic protection is too expensive.

TABLE 1. COMPARATIVE ESTIMATED COST OF STEEL VERSUS ACTUAL COST OF PLASTIC

(No Engineering or Overhead Included)

Estimated Steel			Actual Plastic		
13,620 ft 2-in. st. pipe	@ .34	$4,631	13,620 ft 2-in. plastic	@ .33	$4,495
13,620 ft wrapping	@ .09	1,226			none
13,620 ft trenching and backfilling	@ .11	1,498		@ .11	1,498
13,620 ft labor, including supervision	@ .15	2,043		@ .08	1,090
13,620 ft miscellaneous including trucking and R.R. crossing	@ .07	953		@ .05	681
TOTAL	@ .76	$10,351		@ .57	$7,764
Less Contribution		4,200			$4,200
					$3,564
Investment in Mains		$ 6,151			$3,150
Services & Meters		$ 3,150			
TOTAL INVESTMENT		$ 9,301			$6,714
Average investment Per consumer		$ 124			$ 90
Estimated Net Return of present 75 consumers,			Using Steel	3.3 per cent	
			Using plastic	5.2 per cent	

Other than at street intersections, plastic should not be inserted through the old steel mains, unless it is definitely established that no future service connections from the plastic will be needed. In cases where the steel main is to be relaid with plastic, the old steel pipe is removed, cut in 3-ft lengths and each length longitudinally split with a cutting torch. The 3-ft sections are then spread sufficiently so that they will have an ID size slightly larger than the plastic pipe. The plastic pipe is then laid, a 6-in. strip of felt is placed on top of it and the half section of the old pipe is laid on top of the felt. This serves the purpose of protecting the plastic from penetration by such tools as picks, pavement breakers, etc., and gives the added protection of being able to use a pipe locator. The old steel pipe, having no value, can be processed by the welder who is usually on the job. Future service connections to the plastic main can be made by removing a 3-ft section of the steel cover.

From time to time, all gas utilities are faced with the problem of extending gas service to fringe areas, where investment in mains and services must be kept to the minimum. Because of its lower unit cost, such extensions offer an opportunity to the utility to evaluate the benefits of plastics, without creating any particular hazard, as usually such installations are sparsely settled. Perhaps details on this might be of interest.

A low-cost housing project requested gas service. Houses are two bedroom having approximately 1000 sq ft of livable floor space and selling for $8500. The project is located one mile from the source of supply of natural gas. Total footage of 2-in. main involved was 13,620 ft. Present users total 75. Main extension contributions of $4200 was pledged. *(See Table 1.)*

Upon completion, a shut-in test under 40 psi was run for four days, which indicated the system was bottle tight. On long runs, where the plastic pipe can be fabricated above ground, two men can solvent-weld 5000 ft of 20-ft lengths of 2-in. pipe in four hours.

Experience has demonstrated some "do's and don'ts" when using thermo-plastic pipe and fittings for underground gas distribution. These are summarized as follows:

1. Pipe and fittings should be so installed that they will be free from all construction stresses and strains.

2. Pipe should be snaked in ditch.

3. As with accepted steel construction, no threaded connections should be made underground. This is most important, as thermo-plastic materials have a pronounced cold flow or creep. All plastic-to-plastic connections should be solvent welded. Plastic-to-steel connections should be made by using a compression fitting, making sure that a metal sleeve is inserted in the plastic at the point where compression fitting contacts the plastic.

4. Proper extrusion of the pipe by the fabricator is very important. Before purchase of pipe, the qualifications of the extruder should be closely scrutinized. Sizing and wall thickness are important, and it is recommended that only pipe be purchased that will conform to the recommendations of the plastic subcommittee of AGA.

5. Three acceptable plastic matetrials are available; namely, butyrate (Tenite II), modified styrene acrylonitrile (Kralastic) and Polyvinyl chloride (PVC).

6. Solvents recently developed can be used satisfactorily to solvent weld Kralastic to PVC. The use of this solvent makes the two materials interchangeable. Two concerns manufacturing this solvent are: Industrial Polychemical Service, Gardena, Calif., and Schwartz Chemical Co., New York.

7. There is available a satisfactory plastic service tee or service connection which can be solvent welded on any size main under pressure, without the loss of gas. This fitting is manufactured by Mueller Co., Decatur, Ill.

8. Dresser Manufacturing Co., Bradford, Pa., is developing an "O" ring compression fitting which will eliminate the use of metal insert.

9. Within a short time, acceptable plastic valves, which have been under test for the past three years, will be available. ■

Wisconsin Public Service Corp. has installed plastic pipe in a location where galvanic corrosion has been a severe problem. Here is a report on how they did it.

Plastic pipe used for main replacement in swampy area

By L. M. STOLL, Division Gas Engineer
Wisconsin Public Service Corp., Sheboygan, Wis.

TWO important and related characteristics of plastic pipe —it does not conduct electric current and is not affected by galvanic corrosion—were used to advantage recently in solving a particularly vexing problem in our gas distribution system. The problem involved two pipelines in our rural high pressure system. One line is a relatively new 8-in. steel, mill-wrapped, cross-country transmission line. Rectifiers provide corrosion prevention on this line. The other is an old 4-in. uncoated steel distribution main serving several rural customers.

These lines intersect, but are not interconnected, in a generally swampy area. Soil resistance is low—in the range of 500-2500 ohm cm. One of the rectifiers and graphite anode ground beds for the 8-in. is also located at the crossing of the two steel lines.

Prior to the installation of the 8-in. pipeline, galvanic corrosion on the 4-in. had been particularly severe. After the 8-in. installation, corrosion of the smaller line was compounded by interference effects from the rectifier. Rectifier current was being collected on some 900 ft of the 4-in. bare steel pipe. The current was then flowing back toward the intersection and draining through the soil back to the 8-in. line. Where this current left the 4-in., severe pitting occurred.

The problem, then, resolved into two parts: eliminating the gas leakage on the 4-in. line and the current leakage to the same line. The latter item was primarily responsible for large rectifier power loss and low rectifier efficiency. It was decided that plastic pipe would be ideally suited to this application. Not only would the plastic pipe provide replacement of the leaking 4-in. steel line with the elimination

of galvanic corrosion effects, but it would also serve as an insulator and prevent leakage of rectifier current.

A comprehensive review of the literature involving more experienced users of plastic pipe provided the basis for selecting Tenite butyrate pipe for this job. Particular reference was made to the experiences of Peoples Gas Light & Coke Co. (Chicago), Public Service Co. of Colorado (Denver), and Southern California Gas Co. (Los Angeles). Specifically, the pipe selected was cellulose acetate butyrate, solvent weld, transparent pipe purchased from Busada Supply Co., Maspeth, N. Y. It has the following specifications:

Nominal size: 2 in.
OD: 2.375: in.
ID: 2.125 in.
Wall thickness: 0.125 in.
Weight per ft: 0.46 lb
20 ft per length
Formula: 460 MH
Fabricator's No.: Busada 230

The butyrate pipe was joined with couplings of the same composition using a solvent-weld joint. The simple procedure for making the joint consists of brushing primer solution, and then welding solution, on the inside of a coupling and the outside of an end of pipe; then inserting the pipe into the coupling. Two lengths are butted together inside the coupling at the approximate center of the coupling. This joint is ready for test almost immediately after being made up. The joining of the entire 900-ft section was completed by two men in 1½ hr.—a fast coupling job considering the fact that neither man had handled plastic pipe before. An 80-psig air test was put on the line, and no leaks developed.

Connection of the plastic pipe to

Top photograph shows how two lengths of plastic pipe are lined up for joining. Primer solution is brushed onto end of the pipe, and inside of the coupling. Center photograph shows welding solution being brushed over the primer. Then coupling is pushed onto one end of pipe. End of the second length of pipe and inside of the other half of the coupling are treated with primer and welding solutions. Bottom photograph shows second length being pushed into the coupling to butt against first length. Joint is now complete and ready for test.

the existing steel pipe was made with a regular compression-type coupling. Copper stiffener inserts were slipped into the ends of the plastic pipe to give rigidity to the plastic under the compression coupling.

One unusual phase of the installation work involved a creek and swampland crossing of some 300 ft. To eliminate the necessity of trenching in the creek bed—a relatively difficult and time-consuming job—the 2-in. plastic was pushed through the existed 4-in. steel pipe, which served also as a casing for the plastic.

Since this project was our first experience with plastic main, there was some preliminary speculation as to what difficulties might arise. Actually, no problems of any consequence were encountered in the installation work. The results were considered very successful. Now, our primary consideration is how Wisconsin's cold winters, over an extended period, will affect the plastic pipe. It is our intention to uncover and inspect the plastic at regular intervals and also keep a close watch on possible leakage. The line is now operating at about 5 psig.

Because of the experimental nature of this job, no accurate economic comparisons could be made between plastic and steel pipe installation. However, indications are that plastic pipe in quantity can be installed at the same or lower cost than steel when coating and cathodic protection costs are included in the steel pipe cost. It is contemplated that we will install additional plastic on an experimental basis. ■

One end of the plastic line is fed into the existing 4-in. steel pipe which served as casing through the swamp and under creek bottom. Thin hose in center of picture is compressor hose used as a bypass line across the creek to ensure continuity of service.

At left, a Wisconsin Public Service workman demonstrates the ease of handling the 20-ft lengths of butyrate plastic pipe used on the job. Each length weighs 9.5 lb. At right, the completed plastic main is tied into the existing steel line, which comes from the gate station in the background.

Canadian Report

THE GAS INDUSTRY IN CANADA

By FRANK CHAPMAN

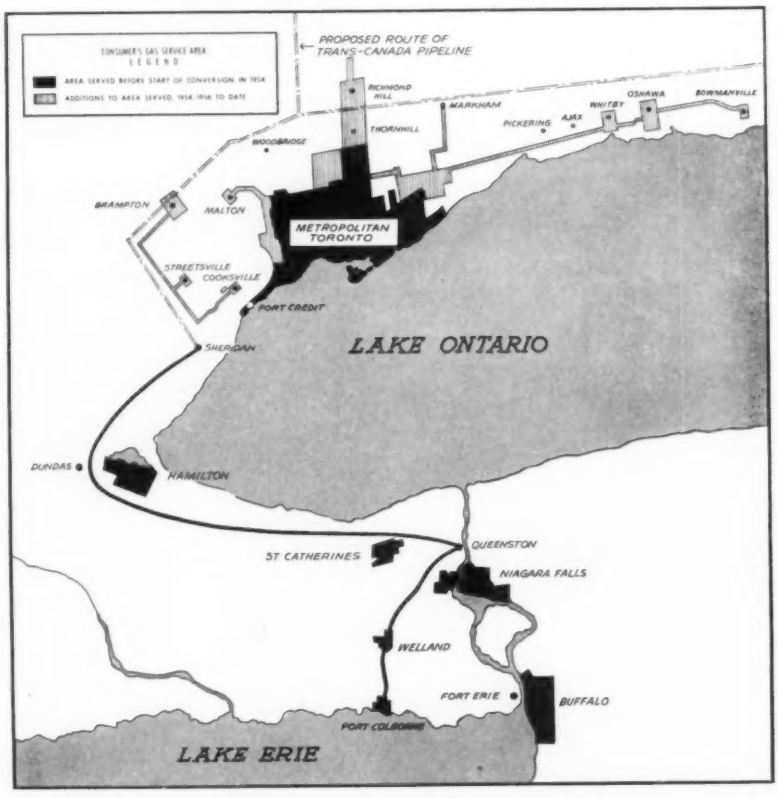
Toronto—hub of eastern Canada's natural gas industry

AGGRESSIVE promotion backed up with good customer service and a competitive price level have joined to make Consumers' Gas of Toronto one of the fastest growing gas companies, if not the fastest growing, on the North American continent.

The company's report for the year 1956 tells part of the story: Total gas sendout for 1956 was nearly double that of the previous year . . . 13,000 new househeating customers added during the year more than doubled the company's domestic heating installations . . . sale of gas to industry increased 15 per cent . . . total miles of mains in service was nearly doubled, while the area served by the company was more than doubled.

But the whole story of Consumers' current and future growth cannot be told in terms of statistics alone. Using natural gas imported from Louisiana and Texas, the company's long range program is to build a load for Canadian gas that will be delivered by Trans-Canada Pipe Lines from the west. The task of building a ready-made load for a new gas pipeline, not to be completed for another year, is in itself an intriguing story of confidence in an industry and in the potential growth of a service area.

Consumers' growth is unique in



Distribution areas served by Consumers Gas Co.

that it has progressed largely because of a planned program aimed simply at winning customers for natural gas. In most other gas companies over the past few years growth is something that has been thrust upon them because of the growth of an area served. Although Consumers' serves a rapidly growing area, the company chose to embark upon the task of expanding its sales of natural gas at a greater than normal rate.

This task resulted in an aggressive sales and promotion program from which a great many other gas companies could take a tip. Witness, for instance, the cooperative appliance dealer sales program which has resulted in the company financing of some $4.5 million in appliance sales contracts during the year 1956. Witness, also, the unequalled record of three voluntary rate reductions in the 24 months since the introduction of natural gas to the Toronto area.

As for over-all system growth, during the past year Consumers' purchased Provincial Gas Co., serving some 20,000 customers, and the Ontario Shore Gas Co., with about 1100 customers. An additional 14 franchises outside metropolitan Toronto also were added to the company's service area. Growth has, in fact, been so rapid that conversion has practically become recognized as a normal operating function.

The fascinating thing about the Toronto picture is that it presents a typical example of a company that has taken cognizance of the current and projected rate of growth of its service area and patterned its own growth program accordingly, with additional sales and promotional effort to exceed what might be termed the normal rate of growth. Metropolitan Toronto's population of 1,384,000 is up over 20 per cent in the past five years, and the area's growth continues to spiral. In the past decade, 500 new industries with an investment of $275 million have opened up 40,000 new jobs in Toronto. The areas served by Consumers' Gas and the immediate potential service area of metropolitan Toronto and its environs have a combined population of about 1.8 million, which constitutes over 35 per cent of the total population of the province of Ontario. This is over 10 per cent of the current total estimated population of Canada, which stands at nearly 16 million.

Consumer's Gas, first incorporated in 1848, introduced natural gas throughout its service area early in 1955. Niagara Gas Transmission Ltd., a subsidiary, has agreements with three gas producing companies in the Texas-Louisiana area for the purchase of natural gas. Niagara also has an agreement with Tennessee Gas Transmission Co. for the delivery of the gas purchased by Niagara into the transmission system of Tennessee, and the delivery by Tennessee of approximately the same annual volume of gas into the Niagara transmission line.

Negotiations with Trans-Canada Pipe Lines Ltd. for a supply of natural gas from western Canada were culminated in a long term agreement dated Oct. 5, 1956. The agreement provides for the purchase of volumes of natural gas ranging from 82.5 MMcf during

(*Continued on page* 78)

	ANNUAL COST	← Other Fuels	Natural Gas →	ANNUAL COST	
HOUSE HEATING 817 Imp. Gal. No. 2 Fuel Oil	$147.88	18.1¢ per gal. 164,000 Btu/ga. Average seasonal efficiency — 65%	1000 Btu/cu. ft. Annual consumption Average seasonal efficiency — 75%	$120.00	**HOUSE HEATING** 100,000 cu. ft.
WATER HEATING 12 KWH	$40.80	$3.40 per KW per month (Flat rate — 1000 watts)	Annual consumption 1000 Btu/cu. ft.	$38.76	**WATER HEATING** 24,000 cu. ft.
COOKING 3000 KWH	$36.00	1.2¢ per KWH (250 KWH per month)	Annual consumption 1000 Btu/cu. ft.	$39.84	**COOKING** 9600 cu. ft.
Total Fuel Cost . . .	$224.68	.....	.....	$198.60	
Service Costs . .	15.00	.....	.....	—	
Total Utility Costs .	$239.68	.....	.....	$198.60	

Table shows comparative costs for gas and electricity in Toronto. Costs are figured for six-room NHA home, insulated, equipped with storm sash. Family consists of two adults and two children. Home has conversion burner and automatic water heater.

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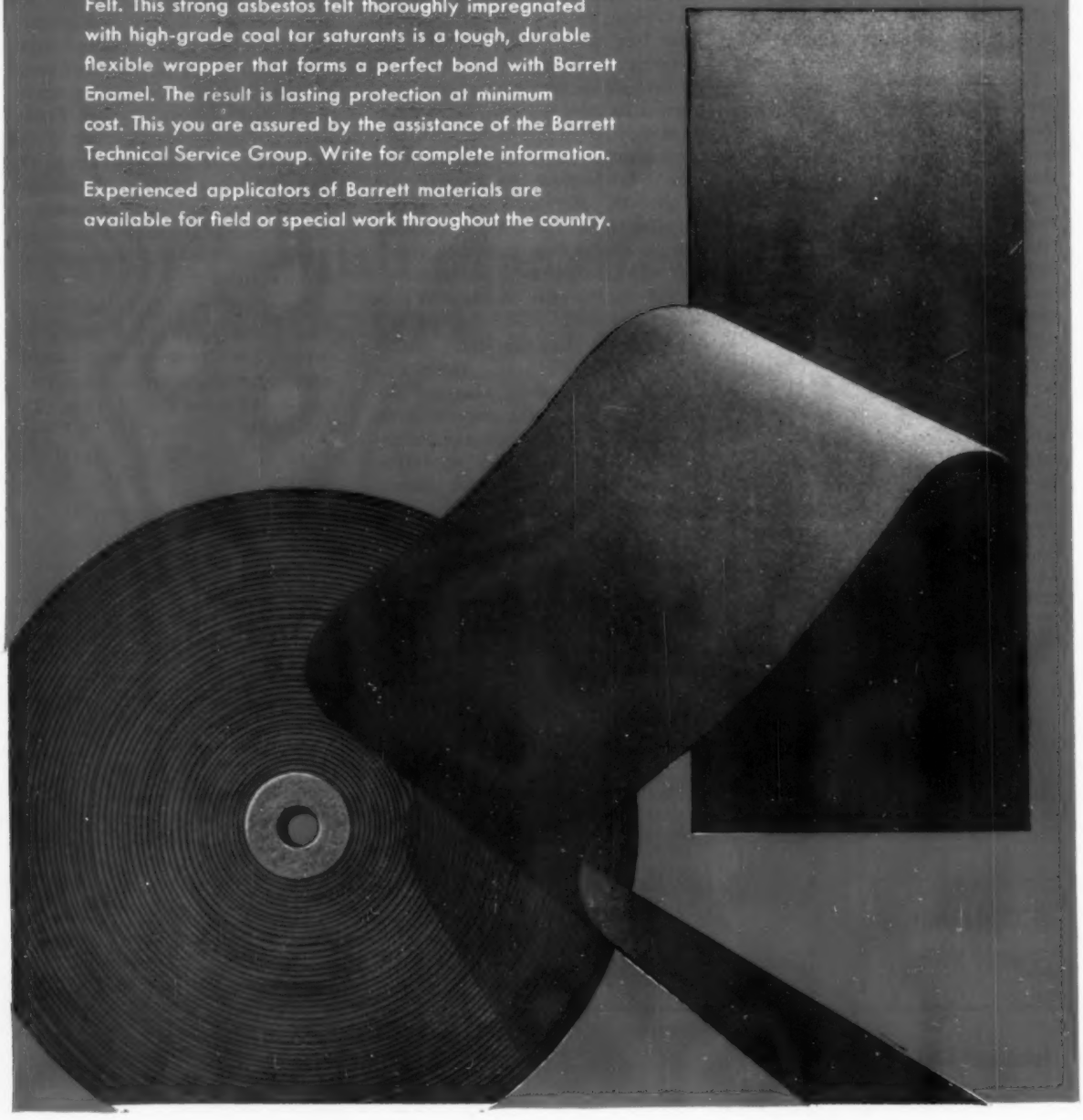

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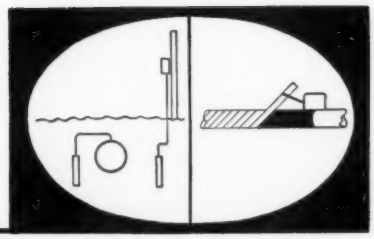


ABOUT 1792, one Luigi Galvani recorded a physical phenomenon that has since been commonly termed galvanic cell corrosion. The destructive current was flowing before the Italian described it and it hasn't stopped since, under a combination of dissimilar metals and specific soil conditions.

Most gas companies—both distribution and pipeline—have some sort of corrosion control group. This department or section of a department is directed toward the ultimate, but probably unobtainable, goal of reducing the cost of corrosion damage to company facilities to absolute zero.

Corrosion control or corrosion prevention groups in the gas companies are generally charged with preventive maintenance and construction to provide a varying degree of protection to both aboveground and belowground material. By far, their greatest responsibility is underground piping.

Unfortunately, complete cooperation is not always extended to a corrosion prevention section from within its own company. Most gas company people indicate the urge for cooperation is there, but at times the means for putting the cooperative urge into action is found missing.

Cooperation between the engineering department and the corrosion control section—which may or may not be a part of the former—is particularly important. In pipelining, the corrosion engineers' evaluation of soils along the route of a proposed project should be given weight. Their recommendations for pipe chemistry, coating and wrapping materials, and protective measures can mean much to the ultimate service period of the pipe to be installed.

These matters carry over into distribution operations, too. There are many areas for cooperation to produce long-life of metallic properties in the distribution companies: for instance, meter setting crews' cooperation will mean that insulating fittings are installed to produce their designed resistance; pipe handling personnel can add a lot to a cathodic protection program by carefully moving and racking all treated and wrapped pipe; the street department can help technicians make periodic cathodic protection surveys and checks; and it goes on and on from there. Actually, everyone in the field for a gas distribution company can help and improve protective measures by cooperation with the people specifically assigned to corrosion prevention work.

Cooperation between all phases of the gas company and its corrosion control personnel means money saved or efficiently applied.

* * * * *

Much work continues to be done on application and evaluation of internal coatings. This subject seems to have taken some of the "spotlight" from the progress being made with established and new external coatings. Of particular interest to gas company corrosion engineers and technicians is the extensive work that was done by the Institute of Gas Technology. It reports a very active year in internal coating research during 1956. Twenty-three different internal coatings are being studied for: (1) resistance to chemical attack, (2) abrasion, (3) bending, (4) impact, (5) blistering, and (6) similar performance characteristics. This work will produce data of immediate practical significance to the gas industry.

* * * * *

A relatively new material—ductile or nodular iron—is undergoing evaluation for corrosion resistance. It may well prove a valuable tool for corrosion prevention in the gas industry.

Corrosion prevention engineers and technicians will want to keep abreast of the development of this material. Ductile cast iron is produced by adding magnesium and/or cerium to liquid cast iron. In the proper proportions, the additives produce graphite precipitation in the form of spherulites instead of as flakes. It has been suggested that pipe produced from ductile iron will exhibit the excellent corrosion resistance produced by cast iron pipe commonly used in the gas industry for over a hundred years, and give mechanical properties similar to those for steel piping.

There is a high-pressure gas pipeline using ductile iron pipe in France. In addition, at least two distribution companies are making experimental use of it in U. S. distribution systems. Properties such as good machinability, flexibility of heat treatment, definite-high yield strength, and excellent resistance to corrosion, make it an interesting material — especially for gas industry piping and components.

* * * * *

Various types of public utilities—gas, electric, water, communications, etc.—plus other industries operating underground structures, are getting together all over the United States to form local corrosion control information and mutual aid associations. In any large city, the several corrosion mitigation programs of a variety of interests are apt to be conflicting. It is to the advantage of gas company corrosion engineers to join and actively participate in these groups.

Some of the groups even attempt to arbitrate basically unsolvable interference problems.

(*Continued from page* 75)

Toronto (continued) . . . Consumers' is confident of the future

the first year following completion of the line to 165 MMcf/day in the fifth year. In contracting for these larger volumes of gas than were considered feasible two years ago, the company is making evident its confidence in the growth of the Toronto area and the potential it presents for natural gas sales.

Under the contract with Trans-Canada, when supplies of western Canada natural gas become available the company will purchase its requirements from Trans-Canada and will discontinue its purchases of Louisiana and Texas gas.

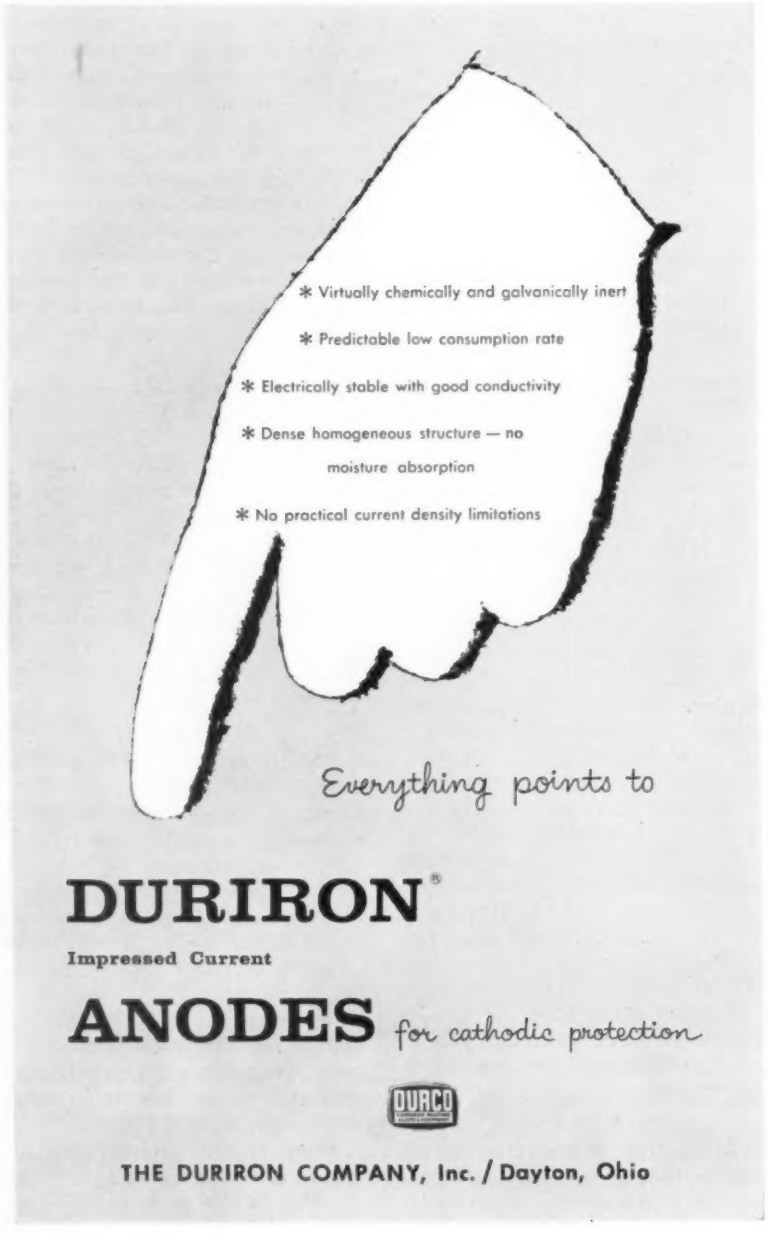
As of the end of 1956 Consumers' served an area of 378 square miles including metropolitan Toronto and several adjoining cities and towns, and an area served by the company's subsidiary, Provincial Gas Co., which includes the cities of Fort Erie, Niagara Falls, Welland and several others across the western tip of Lake Ontario from Toronto. Acquisition of Provincial Gas and several towns near Toronto resulted in a 200-square mile increase in the company's service area over 1955.

At the end of 1956 the company served a total of 170,946 residential, 6240 commercial and 1947 industrial customers. Total gas sendout was over 9 billion cu ft for the fiscal year ending Sept. 30, 1956. The company had a total of 4082 miles of gas mains, reduced to 3-in. equivalent in service at the end of 1956. There were some 1600 actual miles of service connections in use at the same time.

Prior to the company's conversion to natural gas between November 1954, and February 1955, fewer than 60 per cent of approximately 300,000 homes in the Toronto area contained gas-burning appliances. Of these, less than 3 per cent used gas for househeating. In the first full year during which natural gas was available at the lower rates, the number of customers using natural gas for househeating rose from 4475 to 13,349, or 9 per cent of residential customers.

In voluntarily reducing rates three times in 19 months the company has saved its customers in the Toronto area a total of more than $4 million a year in fuel bills since manufactured gas was replaced by natural in early 1955. A household with a gas range and gas water heater burning manufactured gas would have been billed $10.50 a month. The current rate for the same service brings the bill to $6.79. In an average home of moderate size, gas used for heating only would have cost approximately $266 a year in 1955. On current rate structure the same house is heated for about $152, a decrease of 43 per cent.

To stimulate the sale of natural gas by increasing the number of gas-burning appliances in use as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rapidly as possible, Consumers' has introduced a program designed to place emphasis on sales by dealers rather than on company-direct sales. Dealers are given assistance in the preparation of promotional material and in making surveys of prospective heating installations. In addition, dealers are afforded cooperative advertising campaigns and a plan for financing of dealer sales through purchase by the company of appliance sales contracts. Monthly payments for appliances are included with the customer's gas bill.

As a result of this program Consumer's has increased the number of active gas appliance dealers in the Toronto area from a mere five in the fall of 1954 to 220 at the beginning of 1956; a period of less than 18 months. During the same period total appliance sales contracts purchased by Consumers' increased from $4000 to over $3 million. The cooperative dealer program has continued to operate successfully and during 1956 the number of purchased sales contracted exceeded $4.5 million.

As a part of this program the company maintains large, attractive showrooms in its offices for the display and demonstration of gas-burning appliances. In the spring of 1956 a modern home service auditorium was opened in the company's main office building in downtown Toronto. The auditorium, which seats 225 persons, is available to large groups for special meetings. During the past year over 8500 people attended cooking demonstrations, meetings and other promotions in the room.

Rounding out the company's sales and promotional program is a strong policy toward customer service. Oakah Jones, vice president and general manager of the company, is quick to point out that his company is not a monopoly, that it is in competition with other fuels for the customers' cooking, water heating and househeating business, and that any sales or promotional program must ultimately have a basis in sound customer service.

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To step up work schedules on all those scattered, small-yardage trenching jobs around town, look into the mobility and big production capacity of Parsons Trenchmobile. It drives cross-town, through traffic at 12.6 m.p.h. — works fast, too. Digs up to 14½ feet of trench per minute, 8 to 16 inches wide, at depths to 5 feet. Gets the job done in a hurry — drives on to next job *right now*. No waiting for trailer—no loading or unloading delays.

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pany also maintains a continuing instruction program for dealer installation crews with diligent attention paid to regulations of the Ontario Fuel Board.

The company's growth in service area and number of customers since conversion to natural gas has required the expenditure of nearly $4 million for the conversion of distribution facilities and appliances. An additional $10 million has been spent in expansion programs involving additions to plant and equipment in and around the Toronto area. During 1956 the company's three-year feeder main expansion program saw the addition of 28 miles of 12-in. mains, 10 miles of 8-in. mains, 24 miles of 6-in. mains and 29 miles of 4-in. mains at a total cost of $4.3 million.

Toronto . . . 500 new industries invested $275 million and created 40,000 jobs

It is estimated that approximately $4 million will be spent during the current year for distribution system expansion in the Toronto area. Additional expenditures will be made on the company's newly acquired properties.

The development of the natural gas industy in the Toronto area has served as an aid in attracting other new industries to the area and in promoting the growth of existing industry. Notable among these are those industries that supply appliances, equipment and services to the gas industry.

Honeywell Controls Ltd., for instance, the Canadian subsidiary of Minneapolis - Honeywell Regulator Co., which claims to be Canada's largest maker of automatic controls, has greatly accelerated its growth pattern in recent months because of the development of the natural gas market in Canada. Late last year the company launched a $4-million expansion program to include a new plant and office on a 35-acre site in Scarborough. Plans are also on the board for additional plant space to be added by 1958.

Vice President Len Wills of Honeywell said recently that current development of natural gas supplies in central and western Canada had opened up the market for gas equipment as never before.

The Canadian Meter Co., subsidiary of the American Meter Co., another major supplier to the Canadian gas industry, has also expanded its manufacturing facilities near Toronto. Most recent growth includes the addition of $100,000 in plant facilities for the manufacture of domestic gas meters.

Welland Tubes Ltd., Canada's first big-inch pipe mill, was put into operation early in 1957. The mill was built by Page-Hersey Tubes & Steel Co. of Canada primarily to supply the increasing demand for large diameter pipe throughout the dominion. Trans-Canada Pipe Lines has already placed a multi-million dollar order with the mill for pipe for its Alberta-to-Montreal line. ■

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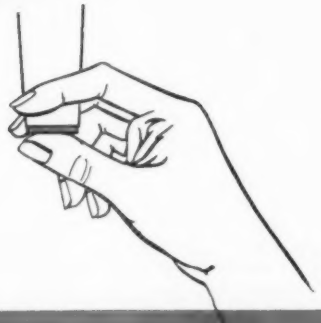

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GAS news

Management wins heated proxy fight

A plan to slice up the Alabama Gas Corp.'s sprawling distribution system and sell parts of it to municipal governments has been beaten down by company stockholders after a heated proxy battle.

The stockholders gave the incumbent management group, headed by Board Chairman J. N. Greene and President R. A. Puryear Jr., a narrow 5-to-4 majority on the board of directors. Fifty-six per cent of the stockholders voted for this faction; the remainder gave their votes to an insurgent group headed by directors Hugh Morrow Jr. and Lewis J. Odess.

The Morrow-Odess faction had advocated selling the distribution systems in 14 Alabama towns to city governments. This group had originally supported S. V. O'Lenic, present president of Chattanooga (Tenn.) Gas Co., as its candidate for president of Alabama Gas. Shortly before the proxy balloting began, Mr. O'Lenic withdrew from the race.

Alabama Gas Corp. has approximately 210,000 meters in service in the 47 cities and towns it serves. The company is headquartered in Birmingham, biggest city in its distribution system. Last year the company sold 524 billion cu ft of gas.

In addition to Chairman Greene and President Puryear, pro-management directors re-elected to the board include Arthur H. Lee, Anniston; Harry H. Pritchett, Tuscaloosa, and Robert S. Weatherly, Birmingham.

Under the cumulative system of voting, the insurgent faction placed Mr. Odess, Mr. Morrow, Lawrence Dumas Jr., (Birmingham), and D. Cooper Wadsworth, (Gadsden) on the board.

Major expansions planned by New York State Natural

Improvements and additions at a cost of $24 million are planned by New York State Natural Gas Corp., Pittsburgh, during the 1956-1957 season.

Ranked among the nation's leaders in storing gas in underground storage pools, New York State Natural, as of Oct. 31, 1956, had 136,663,711,000 cu ft of gas in storage to meet winter demand requirements. The figure exceeds by 10 billion cu ft the amount of gas in storage at the same time in 1955.

Expectations are that the company will have 148,853,824,000 cu ft in storage on Oct. 31, 1957, representing a projected increase over 1956 of more than 12 billion cu ft.

Additional facilities are planned to meet the sharp upswing in demand for gas. New York State Natural sold 131,718,997,000 cu ft of gas in 1956, expects to sell 146,790,000,000 cu ft this year.

Of the 30 new producing wells drilled in 1956, the company had 19 come in as substantial producers. Additional gas, based on original open flow figures, made available by the 1956 drilling program—

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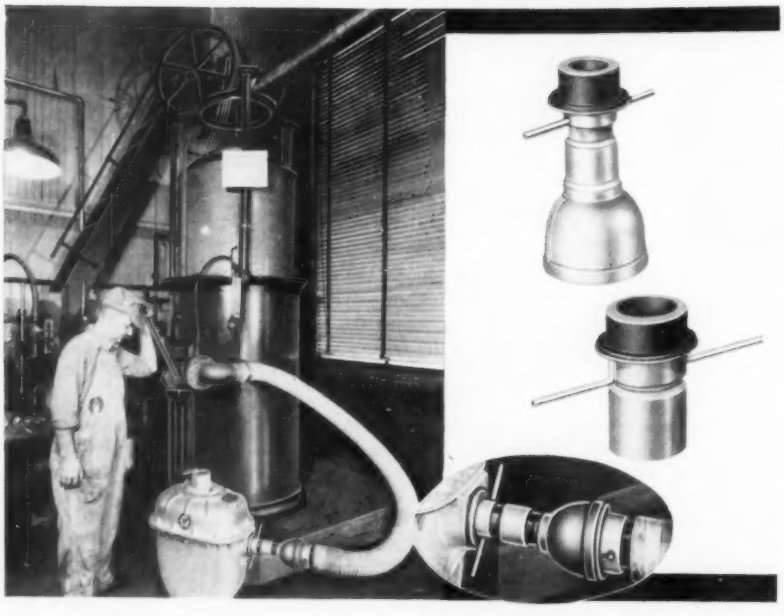

Turn-Tite Adjustable Quick Connectors are made in 3 sizes for 2", 3", or 4" openings. 2" and 3" connectors are available with or without a bell housing permitting single or combination installations. Turning the handle clockwise expands the rubber bushing, making a positive leak-proof seal.

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Remember, well-planned engineering and construction are as important to your general plant additions as they are to your installations of gas production equipment. They mean real economies in maintenance and operation which accrue through the years.

Outdoor installation of 2500 Mcf per hour at 20 psig electric motor driven compressor recently placed in service at the West End Gas Works, Jersey City, N.J., for Public Service Electric and Gas Company, Newark, New Jersey.

UNITED ENGINEERS

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from the production wells alone—amounted to 133,362,000 cu ft per 24-hr day.

In addition, the company laid 53 miles of line in 1956 and expects to lay 55 more miles this year. New York State Natural plans to replace some 15 miles of 20-in. line with 30-in. to meet requirements of Syracuse, Albany, and Auburn areas. An additional 31 miles of new and replacement line will be laid in northern Pennsylvania at a cost of more than $2 million.

SoCal and SoCounties plan $50 million loan

Southern Counties Gas Co. and Southern California Gas Co. plan to borrow $50 million this year.

SoCounties applied to the California Public Utilities Commission for permission to sell $15 million of 25-year first mortgage bonds on March 6. It would use proceeds from the issue to repay its short-term indebtedness to its parent, Pacific Lighting Corp., and to finance expansion and construction.

SoCal plans to raise about $35 million through a bond offering next August or September.

Walter J. Herrman, financing vice president of the Los Angeles company, told the Los Angeles Society of Security Analysts that his company would ask the state PUC for a rate increase to yield it a 6½ per cent return in place of the 6 per cent rate it is now allowed to realize.

He said a higher return was needed because debt capital now costs about 4½ per cent compared with 3 per cent in 1954 and because "earnings under a 6 per cent return have been insufficient to support an adequate market price for the stock of Pacific Lighting, which supplies all of our equity capital."

SoCal realized slightly more than a 6 per cent rate of return in 1956, he said, but "we're sliding away from that this year."

Buy-or-sell program offered small stockholders

Northern Illinois Gas Co., faced with a high proportion of small stockholders, recently offered a special "buy or sell" program to holders of less than 10 shares of its common stock. The plan will reduce bookkeeping expenses.

All stockholders owning nine or fewer shares were given an opportunity to increase their holdings to 10 shares or to dispose of them at the prevailing market price but without the usual brokerage fees and other costs. These expenses were paid by the company. Stockholders holding 10 or more shares were not eligible for the program.

More than a third of Northern Illinois' approximately 129,000 stockholders—about 45,000—own less than 10 shares. This high proportion, a company spokesman said, stems from the manner in which the utility was split apart from Commonwealth Edison Co., Chicago, in 1955. At that time, each Commonwealth Edison common stockholder received three shares of Northern Illinois common stock for each 10 shares of Edison that he held.

"Each stockholder, no matter how many shares he owns, represents the same bookkeeping expense in terms of printing and mailing annual and quarterly reports and printing and mailing dividend checks," the official said.

It is estimated that a company's expenses for these matters might run between 75 cents to $1 a year per stockholder.

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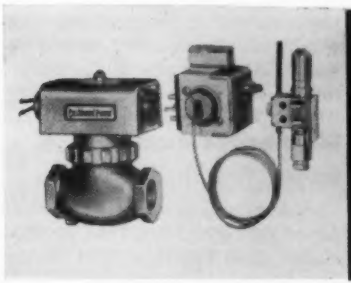

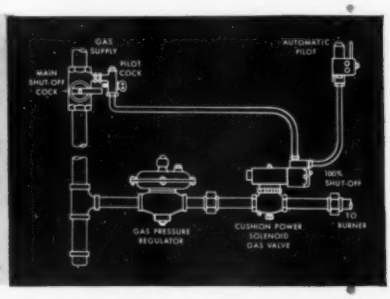

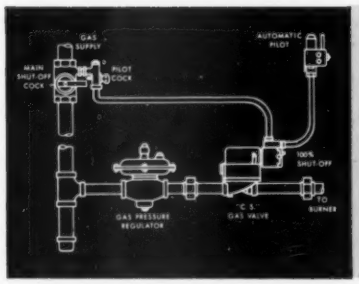

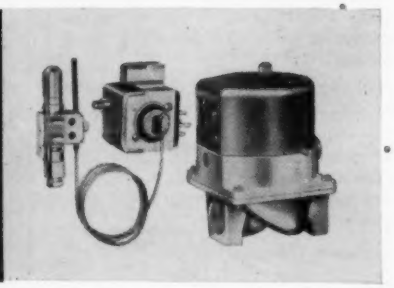

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Although the buy-or-sell program was strictly optional, Northern Illinois was hopeful of reducing its number of small stockholders through the program, thereby cutting the cost of its stockholder bookkeeping expenses.

Wyoming bill proposes repaying relocation costs

A bill introduced in the Wyoming legislature would transfer to the state and federal governments the cost of moving or altering public utility facilities in connection with highway projects.

New $2 million plant of Bridgeport Thermostat division, Robertshaw-Fulton Controls Co., located in Milford, Conn., doubles size and capacity of former plant. Modern brick and steel structure has 180,000 sq ft.

The bill would provide for payment of relocation of utility facilities on a matching basis, with the state paying 65 per cent on primary and secondary roads and the state and federal governments paying 93 per cent on interstate highways. The utilities now pay all of the cost of such relocation, except where they have prior rights.

Thurman Sherard, deputy state highway superintendent, opposes the measure on the grounds that it would diminish the number of miles of highways that could be built.

Method of naming PSC under fire in Vermont

A Vermont senator who several years ago proposed that members of the state public service commission be elected by popular vote, has introduced a bill in the Vermont legislature proposing that the legislature choose members.

At present Vermont PSC members are appointed by the governor with consent of the state senate. The new bill would provide for the first legislative election of PSC members in the 1959 session. They would be chosen in the same manner as state supreme and superior court jurists and a number of other officials.

Appliance sales boomed at Brooklyn Union in '56

Equipment sales by Brooklyn (N. Y.) Union Gas Co. totaled $7,128,792 in 1956, a new high, ac-

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cording to an end-of-the-year report by John B. Frost, BU's utility's sales manager.

Most outstanding sales accomplishment for the year was the sale of househeating installations. In this competitive market, sales were 31 per cent above quota and for the first time in the company's history sales of domestic gas heating equipment in one- and two-family structures outnumbered new oil burner installations.

Credit for the record-breaking year was given the intensified employee lead-getting plan, aggressive sales efforts, and an accelerated plumber-dealer campaign. Employee leads, which numbered 40,630, accounted for $2,270,536 of the total sales.

A perfect performance was turned in by Brooklyn Union's salesmen in selling gas cooking in the new home field. Every one of the 2669 homes built in 1956 in the utility's franchise area was equipped with a gas range. In addition, four out of every five new homes also installed central gas heating units.

Insurance financing of utilities at peak

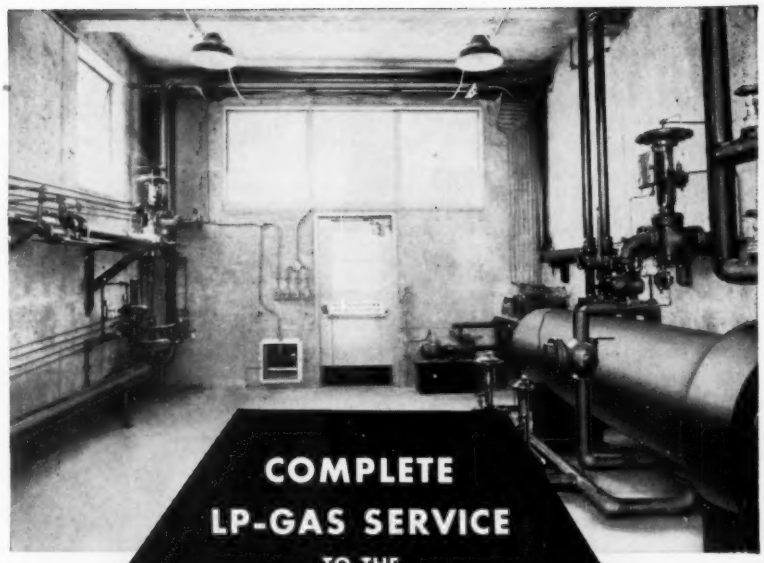
More than half of the long-term financing needs of the nation's public utilities have been met by life insurance policyholders, through their policy funds, according to the Institute of Life Insurance.

At the beginning of 1956, of the $13.9 billion public utility bonds held by the U. S. life companies, $13.5 billion were bonds of U. S. corporations. This represents an investment of $130 per policyholder. The total funded debt of these utilities was just under $25 billion.

Gas utilities and pipeline companies accounted for $3,160,000,000 of the life company utility bond holdings. The pipeline bonds totaled $1,884,000,000 and the utilities $1,276,000,000.

Other utilities: electric, $7,415,000,000; telephone and telegraph, $2,434,000,000; private water, local transit and miscellaneous, $528 million.

Public utility holdings of life insurance companies have increased materially in recent years, as the facilities to power the expansion of the economy have grown. Total public utility bond holdings of the life companies at the start of last year were $8,756,000,000 greater than 10 years earlier and nearly



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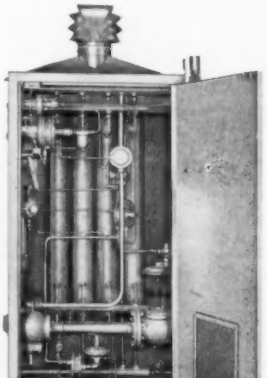

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seven times the 1935 figure. In the early 1920s, only 2 per cent of the life company assets were invested in public utility bonds.

Public utility bonds have become one of the important investment portfolios with the life insurance companies, now accounting for more than one third of the securities of business and industry held by them, the institute reports.

The spread of long-term financing out across the country is shown in the public utility portfolio. A recent analysis of the holdings of a representative group of life companies showed that the investment in public utility bonds of southern and western utilities have grown more rapidly than eastern utilities, in the company portfolios. In the past 10 years, the bonds of utilities in the Southwest have more than quadrupled in the life insurance portfolios; in the Mountain states they have nearly quadrupled; the east south central states and Pacific Coast states, they have more than tripled; and in the other regions, excepting only Middle Atlantic, they have more than doubled. In the Middle Atlantic states, the increase has been just under 100 per cent.

Thirteen gas companies win management awards

Thirteen gas companies won the American Institute of Management rating of Excellent Management for 1956.

The winners are: Pacific Gas & Electric Co., Pacific Lighting Corp., Cincinnati Gas & Electric Co., Washington Gas Light Co., El Paso Natural Gas Co., Lone Star Gas Co., Oklahoma Natural Gas Co., Panhandle Eastern Pipe Line Co., Portland Gas & Coke Co., Niagara Mohawk Power Corp., Equitable Gas Co., Baltimore Gas & Electric Co., Consolidated Edison Co.

Companies are rated by the American Institute of Management on every function of management and not just on profits. There are 10 basic categories of management performance used by the institute to study Canadian and American business. An audit committee makes the final ratings, using a point schedule which requires 7500 of a possible 10,000 points for excellence.

The companies are studied from the point of view of their economic justification as well as their treat-

ment of shareholders, customers, and the public. Their capital structure as well as the customary figures are closely scrutinized, but the greatest weight is given to the evaluation of the executive team.

Atlanta Gas doubles common capital stock

Atlanta (Ga.) Gas Light Co.'s charter has been amended to authorize an increase in the common capital stock to 2 million shares with par value of $10 per share. This is twice the former authorization.

According to President R. G. Taber, there is no immediate intention of placing additional common stock on the market. The amendment was adopted by stockholders, however, to provide financing for future capital improvement.

Utility appliance sales target of Wyoming bill

A bill to keep gas or electric utilities out of the retail or wholesale appliance merchandising business was introduced in the Wyoming legislature recently.

The bill would prohibit "a public utility . . . from using any portion of its utility plant, property, facilities, or utility employees for the purpose of operating or conducting a retail or whole merchandising business."

Proponents of the bill contend that the participation of a utility in wholesale or retail merchandising amounts to "unfair competition."

Southern California Gas sets $44 million budget

A record high $44 million budget —largest in the company's 89-year history—has been set by the Southern California Gas Co., Los Angeles, to cover capital expenditures during 1957.

The new budget reflects estimated costs for construction and expansion to match the increased population and enlarging industrial centers in the utility's service area, President and General Manager F. M. Banks said in releasing the figure.

Included in the 1957 budget is a major portion of the 224-mile, 30-in. line now under construction from Needles to Newhall, as well as greater than normal new building expenses due to carryovers from the 1956 building projects.

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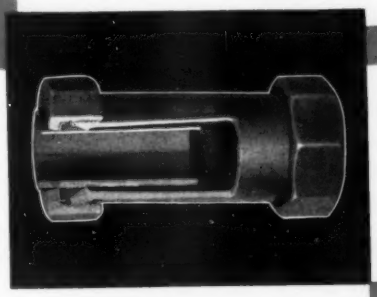

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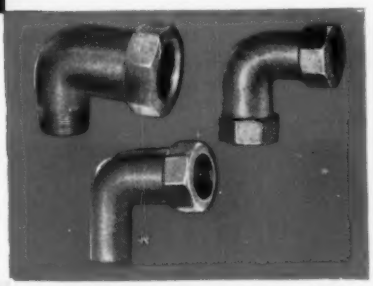

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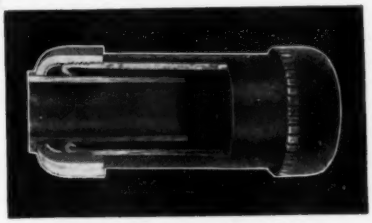
NORMAC #50-A STEEL COUPLINGS
Manufactured from extra heavy wall pipe. Couplings are available with either seamless or welded centers in sizes from ¾" to 1½" inclusive. 10" and special length centers available.



Normac also manufactures a complete line of red brass fittings in O.D. sizes: ⅝", ⅞", 1⅛", 1⅜"—and a complete line of insulated couplings and fittings.

NORTON-McMURRAY MFG. CO.
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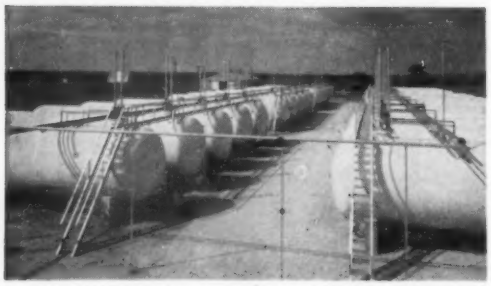
Couplings Meter Bars Sleeves Cocks Ball Joint Clamps Service Tees & Ells

DRAKETOWN

PROPANE PLANT OF THE MONTH



THE WORD FOR Service
Ipalco
Iowa Power and Light Co.

Peak Shaving and Standby Plant for Iowa Power & Light in Des Moines. Complete design and construction by Draketown. Supplements and substitutes for natural gas, will reduce demand charges. Plant pays for itself in one year.

Many other large and small manufacturers and utilities rely on Draketown for absolute dependability of gas supply; automatic or manual operation with savings all down the line. Over thirty-five years of gas engineering experience is built into every Draketown Plant.

DRAKE & TOWNSEND, Inc.

CONSULTING — DESIGN — ENGINEERING — CONSTRUCTION
11 WEST 42nd STREET, NEW YORK 36, N. Y.

Members of: American Gas Ass'n, LP-Gas Ass'n, American Petroleum Institute, National Fire Protection Ass'n, Canadian Gas Ass'n, Agricultural Ammonia Institute.

news • *Continued*

Total cost of the Needles pipeline project, which includes a second section already completed between Alhambra and Needles, will reach $33.5 million when it is completed by the combined Southern California and Southern Counties Gas companies later this year. When finished, the new line, extending 285 miles from the California border, will transport about 242 MMcf/day into southern California.

In addition to the cost of reinforcing the present gas supply system, the capital budget is primarily used to cover cost of adding new customers and to support a program for plant and property replacements and additions, Mr. Banks explained.

Largest single item in the budget is about $21 million for transmission facilities including the new pipeline and continued expansion and improvement of the utility's underground storage project at Playa del Rey.

Cost of installing new mains, meters and services to bring gas to new customers, which have averaged 64,000 annually, will

YOU GET ALL THREE WITH

SINCLAIR BUTANE-PROPANE

Sinclair's vast facilities—natural gasoline plants, refineries, storage plants, tank cars and trucks—are at your service when you use Sinclair's famous LP Gas in your installations. What's more, you have the know-how of experienced Sinclair engineers on call at all times, ready to solve *your* problems. For uniform high quality of product, trouble-free operation and prompt dependable service, switch to Sinclair Butane-Propane today.

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Sinclair Oil and Gas Company
Liquefied Petroleum Gas Sales Department
Sinclair Oil Building, Tulsa, Oklahoma

SINCLAIR
A Great Name in Oil

reach $18 million, while new buildings and general items will require more than $5 million. This includes construction or major alterations to four operating bases, an office and two divisional headquarters buildings.

Standards association issues heater equipment

Greater convenience, comfort and security for the users of gas-fired room heaters is assured by the adoption and enforcement of new gas-fired room heater approval requirements.

Published as an American Standard on Jan. 1, 1957, the new requirements were developed under the sponsorship of the American Gas Association working through the procedure of the American Standards Association. The publication bears the designation, ASA Z21.11-1956.

"This voluntary effort of private industry in the field of gas appliance and equipment manufacturers marks another achievement toward the national unification of approval requirements which are consistent and designed to benefit both industry and consumer," according to George F. Hussey Jr., managing director of the ASA.

These requirements represent basic standards for safe operation, substantial and durable construction and acceptable performance of gas-fired room heaters.

General Controls acquires counting device firm

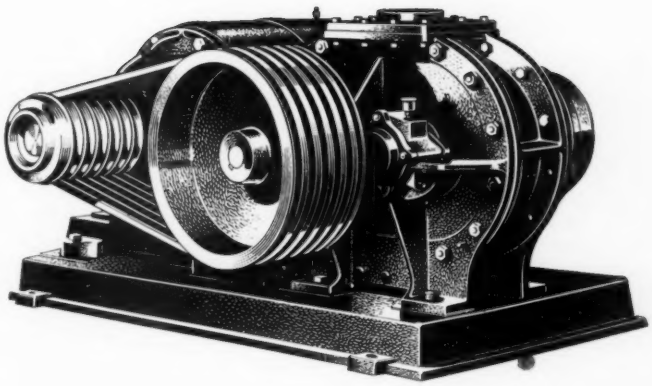
Shareholders approval has been obtained for the merging of Production Instrument Co., Chicago, with General Controls Co., Glendale, Calif.

The transaction involves the purchase of all assets of Production Instrument, manufacturer of mechanical and electric counting devices, in return for an undisclosed amount of General Controls common stock.

Production Instrument will operate as a separate division and its manufacturing facilities will remain in its present Chicago location.

GAS news notes

More than 10,225 years "on the job" have been amassed, collectively, by 423 employees of Southern Counties Gas Co. The 423 repre-



R-C gas pumps eliminate friction and leakage problems

One of the many operating advantages of Roots-Connersville rotary positive displacement gas pumps are the exceedingly small losses due to leakage and friction. This high efficiency is assured by the inherent design of the pump in which the impellers operate without internal contact. Yet so accurately gauged are the clearances that slippage is reduced to an absolute minimum. Maximum power savings are realized since horsepower required is determined by operating pressure.

From 5 to 50,000 cfm, these pumps assure positive control of both volume and pressure. Design simplicity further assures long term peak performance with little down-time and maintenance held to a minimum.

Available in 76 capacities and sizes, R-C rotary gas pumps can be exactly matched to your requirements. For engineering data, write for Bulletin 32-33-B-13 or Bulletin 31-B-17 on small pumps.

Engineers—unusual career opportunities await you at Roots-Connersville. Address your resume to Professional Employment Manager.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

357 Oregon Ave., Connersville, Indiana. In Canada—629 Adelaide St., W., Toronto, Ont.

sent more than one-fifth of the company's working force. Presenting 15-year pins to the group has been Guy W. Wadsworth Jr., president and general manager, himself a veteran of 27 years with the company.

A further increase in the capacity of Tenite polyethylene manufacturing facilities of Texas Eastman Co., a division of Eastman Kodak Co., has been announced. With the addition of new production equipment at the Longview, Texas, plant, annual capacity has been increased to 55 million lb.

Of the $95 million approved for construction and expansion in 1957, Consumers Power Co., Jackson, Mich., has allotted $18 million for gas expenditures. An additional $13 million will be spent on office and service building construction and improvement, and other general projects.

Clarence B. Petty & Co., Needham Heights, Mass., has been named sales representative for Fisher Governor Co., Marshalltown, Iowa. The Petty organization will cover Boston and the New England area.

Southern Union Gas Co., Dallas, has added the 30th New Mexico town to its distribution system with the purchase of Clayton from Pioneer Natural Gas Co. Martin E. Nesbitt will manage the Clayton operation, which becomes part of Southern Union's eastern New Mexico district.

Cleveland Trencher Co. has appointed Mississippi Road Supply Co., Jackson, Miss., as distributors for the complete Cleveland line. The distributor's territory includes all of Mississippi except the 17 northernmost counties.

Construction is under way on San Diego (Calif.) Gas & Electric Co.'s new $590,000 accounting building. The 50,000-sq ft building will be completely air conditioned. It is scheduled for occupancy in October of this year.

Agreement has been reached with Acro Manufacturing Co., Columbus, Ohio, whereby Robertshaw-Fulton Controls Co. will acquire all of the assets and business of Acro, which operates plants at Columbus and Hillsboro, Ohio.

Titan Valve & Manufacturing Co., Cleveland, Ohio, recently celebrated its silver anniversary in the manufacture of thermostats. The company was organized in 1932 by W. T. Bentley. Since the death of Mr. Bentley, his widow, Mrs. Edith M. Bentley, has served as president of the company.

New York State Electric & Gas Corp., Ithaca, N. Y., has allotted $6.5 million for the extension and enlargement of its natural gas facilities in 1957. Included in the program is an increase in facilities to extend gas service to additonal communities adjacent to areas now served by the company.

Cobell Industries, Fort Worth, Texas, manufacturer of air conditioning equipment, has been sold to a group of Cleburne, Texas, business men. The group is headed by R. E. Roberts, president of Roberts Manufacturing Co. Other officials of the new operations are Harold B. Bailey Jr. and Paul Ashley.

More than

2 MILLION FEET OF ½ INCH KRALOY SERVICE PIPE

already installed

Since 1945 more than two million feet of one-half inch Kraloy Plastic Pipe has been installed for natural gas service lines. This one-half inch PVC pipe has done a job superior to that of ¾ inch, and larger pipe, when made of other materials.

One-half inch Kraloy PVC Pipe can also supply more than an adequate volume of natural gas to your customers. Kraloy can do this because of its mirror-smooth interior walls which result in an extremely high C factor.

Other Kraloy advantages:

1. Kraloy is permanent—not subject to electrolysis, rot, rust or scale.
2. Kraloy's flexible strength allows it to be installed faster and easier.
3. Kraloy's lighter weight lets your trucks carry more pipe footage.
4. Kraloy delivers cleaner gas—reducing foreign deposits in jets, valves, etc.

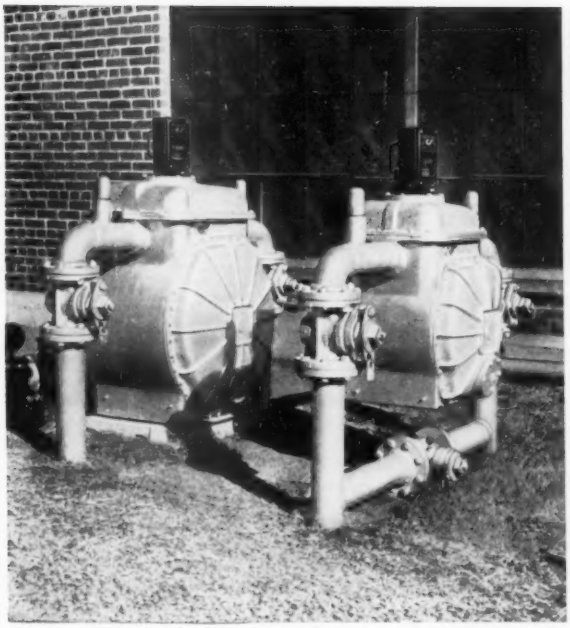
WHEN YOU SPECIFY YOUR NEXT INSTALLATION, DO AS OTHER LEADING GAS COMPANIES DO...SPECIFY KRALOY PVC PLASTIC PIPE!

Representatives:
The Mott Co.—Dallas and Houston
Southeastern Distributing Co.—Miami

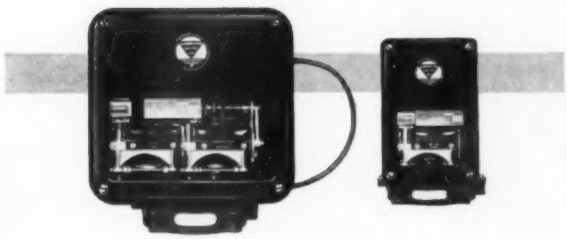
Call, write or wire for detailed information and specifications.

KRALOY *plastic pipe co., inc.*

4720 East Washington Boulevard, Los Angeles, California
Subsidiary of the Seamless Rubber Co., a Rexall Drug Co. Subsidiary



Temperature and pressure compensated metering continuously and automatically



American® BASE VOLUME INDEXES register gas quantity at standard conditions of base temperature and base pressure. BASE PRESSURE INDEXES automatically multiply volume at pipe line conditions by the pressure factor and indicate quantity at base pressure on a straight reading index.

Operation of both instruments is continuous with all functions performed mechanically through special gearing. Indicated totals are always accurate.

For full information, consult your American Meter representative.

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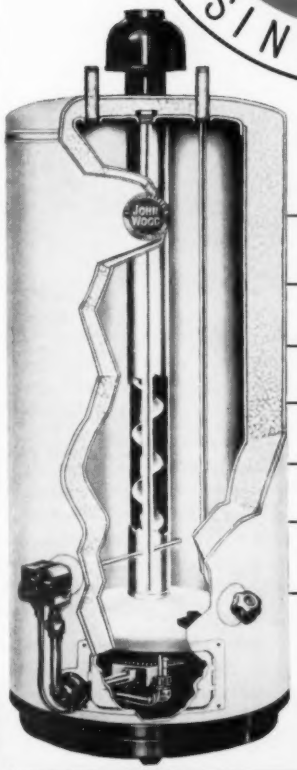

The off-center flue makes the difference

- **Off-Center Flue** Travels the Heat Further
- **Extra Heavy Tanks**
- **Helical Heat Retarders**
- **Extra Heavy Insulation**
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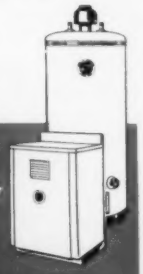
- **Extra Heavy Bottom Pan**
- **Combination Thermostat and Safety Pilot** with Built-in Filter



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ALL PIPE EQUIPMENT

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GAS calendar

March

7- 8. . SGA Transmission Management Roundtable conference—Roosevelt Hotel, New Orleans.

7- 8. . SGA Distribution Management Roundtable Conference—Roosevelt Hotel, New Orleans.

13-14. . PCGA Customers Service Conference—Miramar Hotel, Santa Barbara, Calif.

11-15. . National Association of Corrosion Engineers—Kiel Auditorium, St. Louis, Mo.

19-20. . PCGA Residential Sales Conference—Seattle, Wash.

21-22. . PCGA Non - Residential Sales Conference—Seattle Wash.

21-22. . New England Gas Association Annual Meeting—Hotel Statler, Boston.

25-27. . AGA General Management Section — Edgewater Gulf Hotel, Edgewater Park, Miss.

25-27. . Mid-West Gas Association — Hotel Nicollet, Minneapolis.

28-29. . Oklahoma Utilities Association Annual Convention—Tulsa.

April

8-10. . National Conference of Electric and Gas Utility Accountants—Sheraton-Park Hotel, Washington, D. C.

8-10. . GAMA Annual Meeting — The Greenbrier, White Sulphur Springs, W. Va.

8-11. . AGA Distribution, Motor Vehicles and Corrosion Conference —Rice Hotel, Houston.

16-18. . Petroleum Industry Electrical Association & Petroleum Electric Supply Association 29th Annual Convention & Exhibit—Shamrock-Hilton Hotel, Houston.

16-18. . Southwestern Gas Measurement Short Course—College of Engineering, University of Oklahoma, Norman.

16-18. . AGA Sales Conference on Industrial and Commercial Gas—Jung Hotel, New Orleans.

24-25. . PCGA Accounting Section Spring Conference — LaPlaza Hotel, Carmel, Calif.

24-26. . Natural Gasoline Association of America 36th Annual Convention Rice Hotel, Houston.

25-26. . Indiana Gas Association—French Lick-Sheraton, French Lick, Ind.

29-May 1. . Southern Gas Association Annual Convention — New Orleans.

May

Natural Gas & Petroleum Association of Canada—Hotel London, London, Ont., Canada.

2- 3. . PCGA Distribution Conference—El Mirador Hotel, Palm Springs, Calif.

6- 7. . AGA Residential Gas Section Eastern Sales Conference—Hotel William Penn, Pittsburgh.

7- 9. . AGA Research & Utilization Conference—Cleveland, Ohio

8-10. . Joint AGA-PCGA Gas Supply, Transmission & Storage Conference—Mark-Hopkins Hotel, San Francisco.

19-22. . TIPRO Convention — Galvez & Bucaneer Hotels, Galveston, Texas.

20-22. . AGA Mid-West Regional Gas Sales Conference — Edgewater Beach Hotel, Chicago.

20-22. . AGA Chemical, Engineering and Manufactured Gas Production Conference — Balmoral Hotel, Miami Beach, Fla.

20-23. . 29th Annual Exhibit of the Oil & Gas Power Division of ASME—Kentucky Hotel, Louisville.

21-23. . Pennsylvania Gas Association Annual Meeting—Pocono Manor Inn, Pocono Manor, Pa.

29-31. . 12th Annual Short Course in Gas Technology—Texas College of Arts & Industries, Kingsville, Texas.

June

4- 6. . Second Annual Appalachian Underground Corrosion Short Course —West Virginia University, Morgantown.

24-27. . Canadian Gas Association—Jasper Park Lodge, Jasper, Alberta, Canada.

24-25. . Michigan Gas Association — Grand Hotel, Mackinac Island, Mich.

September

3-. 5. . Pacific Coast Gas Association Annual Convention—San Francisco.

6. . New Jersey Gas Association Annual Meeting—Spring Lake, N. J.

9-13. . AGA Industrial Gas School—Hotel William Penn, Pittsburgh.

11-13. . Mid West Gas Association Gas School and Conference—Iowa State College, Ames.

13-14. . Maryland Utilities Association 33rd Annual Fall Conference—Cavalier Hotel, Virginia Beach, Va.

16-18. . AGA 9th Annual Accident Prevention Conference — St. Louis, Mo.

October

7- 9. . AGA Annual Convention—Kiel Auditorium, St. Louis, Mo.

10-11. . California Natural Gasoline Association Annual Fall Meeting—Huntington-Sheraton Hotel, Pasadena.

11-14. . American Petroleum Institute—Conrad Hilton Hotel, Chicago.

GAS

associations

Challenging program set for management conference

A challenging and informative program will be presented at the American Gas Association's general management section conference at the Edgewater Gulf hotel, Edgewater Park, Miss., on March 25-27.

After a welcoming address by R. A. Puryear, president of the Southern Gas Association and Alabama Gas Corp., delegates will hear Louis A. Allen, consultant of Booz, Allen & Hamilton, Chicago, speak on "New Concepts in Management and Organization." He will give a picture of management as an integrated science, of which organization planning is a vital element. His comments will be based on the results of a three-year nationwide study he recently completed.

The intriguing ramifications of the economic situation will be the subject of a talk by Dr. Watrous H. Irons, president of the Federal Reserve Bank of Dallas. He will present highlights of the economic situation during this year's first quarter and comments upon the outlook for the rest of the year.

The luncheon session on the first day of the meeting will hear from AGA President Clare Zachry, whose talk is entitled "A Place in the Sun."

The afternoon session leads off with Alexander M. Beebee, chairman of the board of Rochester (N. Y.) Gas & Electric Corp. His talk, "Safety—A Powerful Tool—Is Management's Major Problem," will point the intimate relationship of public and employee relations with the safety record that a company establishes. Technical and production problems are relatively simple when compared with the complications of the impact of safety upon public and employee attitudes.

The "Off-Shore Outlook" will occupy attendants during the latter half of the afternoon session. Ira

"We needed accurate control... We got it with BUCKEYE!"

...says Raymond F. Pitman, President, Universal Pipeline Constructors, Inc.

"Our contract with Intermountain Gas Company calls for pipe installation in 17 Idaho towns," reports Raymond F. Pitman. "For close-quartered ditching like this, we need fast, accurate control. We're getting it with our Buckeyes!"

Instant control with Buckeye ditchers is the result of live-action hydraulics. Pitman says, "In really tight places, such as narrow alleys, the hydraulic conveyor drive lets us keep working right past obstacles. It also means that we can place spoil on either side and at any distance from the machine. For work over and around existing service lines, the hydraulic digging wheel hoist gives us good 'live' control. Since the digging wheel hoist and conveyor drive operate independently, adjustments can be made without stopping forward travel."

Arrange to see a Buckeye in operation . . . you'll *like* what you see! Call your GarWood-Buckeye dealer soon, or write to: Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.

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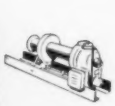
GarWood Buckeye



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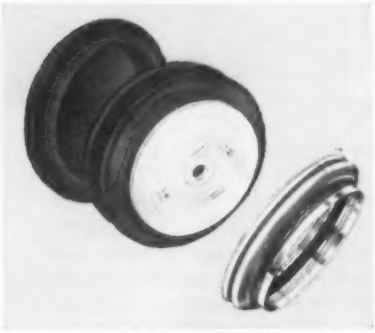

The diaphragm inside your meter determines the accuracy of your recordings. Vulcan Diaphragms are your assurance of accuracy, long-life and minimum maintenance.

Pioneer in the Synthetic Diaphragm field, Vulcan stays ahead with ultra-modern development and manufacturing facilities.

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Gas Meter Diaphragms
Diaphragms for Regulators & Controls

H. Cram, senior vice president, Continental Oil Co., Houston, will review activities in offshore exploration and development as well as the outlook for the future. His review will include a forecast of the rate of growth of reserves and the ultimate availability of gas from these "prime hunting grounds."

Tuesday's general session will lead off with Theophil C. Kammholz, formerly general counsel of the NLRB. His talk, "The 1957 Labor-Management Scene — And a Look Ahead," will analyze the government's part in labor-management relations under the Wagner Act and the Taft - Hartley amendment.

Management men will also hear from James E. Gay, president of the Midwest Stock Exchange, speaking on stockholder relations.

During the luncheon session, Charles E. Parker, president of Central Surveys Inc., Shenandoah, Iowa, will discuss the problem of municipal ownership. The title of Mr. Parker's talk, "Utility Employees Divert Municipal Ownership," indicates his thesis. If informed and motivated to use their information, utility employees can play a leading role in diverting the current trend toward municipal or other government ownership.

On the last day and a half of the conference, there will be three open meetings. They include purchasing and stores, insurance, and personnel committee sessions.

Panel groups highlight NEGA's 31st annual meet

The two-day meeting of the New England Gas Association, scheduled for Boston's Hotel Statler on March 21-22, will cover a wide range of subjects from public relations to natural gas in New England to a national gas industry panorama.

The 31st annual convention gets off Thursday morning with the election of officers, a report on the association's year by Managing Director Clark Belden, an address by NEGA President Fred H. Faulstich, and an inspirational address by Edward McFaul, teacher and lecturer.

The afternoon session will be devoted to a public relations panel, which will cover public relations trends in the business world, structure for a PR program, important things to be done—how to do them

YOU *Don't* HAVE TO REACH to reduce "UN-ACCOUNTED FOR" GAS LOSSES

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and what not to do. Horton L. Chandler, assistant to the president of New England Gas & Electric Association, will chairman the panel made up of Walter G. Barlow, Opinion Research Corp.; Eugene F. Martin, Carl Byoir & Associates; and Remick McDowell, Peoples Gas Light & Coke Co. and former chairman of the AGA PR committee.

Following the PR panel, Hall M. Henry, vice president and director of gas operations, NEGEA Service Corp., will chairman the operating panel, which will discuss natural gas in New England — past and future. Topics to be discussed are standby facilities, storage, and development of distribution systems. Panel members are Donald Ballou, City of Holyoke Gas & Electric Dept.; Harold M. Kopp, Connecticut Light & Power Co.; and John L. Turnan, Worcester Gas Light.

Friday morning will be devoted to the national gas industry panorama, a symposium with Chester S. Stackpole, managing director of the AGA, as master of ceremonies.

Participating in the program will be Leon Ourusoff, Washington Gas Light Co., discussing all-year air conditioning sales possibilities; Allen D. Schrodt, director of AGA's PAR program, "What PAR Means to Our Industry"; Frank H. Trembly, Philadelphia Gas Works, "What TV Means to Our Industry"; Thomas H. Lane, Lennon & Newell Inc., AGA's advertising agency, "Double Dividends From Your Advertising — National and Local"; Julius Klein, Caloric Appliance Corp., speaking as president of GAMA; Cecil M. Dunn, Magic Chef Inc., "What Is the Future for Gas Ranges?"; Harold Massey, GAMA, "Modern Ways to Promote New Gas Appliances Locally"; and C. H. Zachry, Southern Union Gas Co., speaking as president of AGA.

Friday afternoon will offer two panels, one on accounting and the other on sales.

Long-range planning is the main theme of the accounting panel, and will cover the necessity for it; revenue, expense, capital requirements; and the accounting department's function. Wallace A. MacDonald, Hartford Gas Co., will chairman the group composed of Burdette A. Johnson, NEGEA Service Corp.; Otto Price, Boston Gas Co.; and Gilbert J. Williams, Connecticut Light & Power.

"The Job Ahead — Ceilings Unlimited" is the theme of the sales panel presided over by Wilbert L. Miller, Gas division of NEES.

There's a Big Difference in Pipe Vises

It pays you to see the popular RIDGID line of Pipe Vises before you buy

Special work-saver features on every one — LonGrip jaws that grip tighter without chewing up pipe . . . pipe rests that hold pipe firm for better threading . . . handy built-in pipe benders . . . modern streamline design for efficient operation, yoke and chain — bench, stand, post models. More for your money when it's a RIDGID — order from your Supply House!

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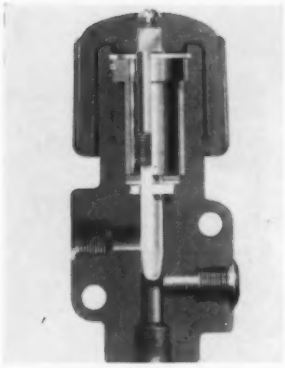
RIDGID
Work-Saver Pipe Tools

Gas Digest

A digest of what's new in products and trade literature compiled by the editors of GAS as a reader service.

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 101, 102



1. Needle valve

A new bubble-tight needle valve from Chemtrol Corp. has been designed to meet the requirements of systems where corrosion problems exist.

Non-toxic and nonflammable, Chemtrol needle valves are manufactured from PVC (polyvinyl chloride), Teflon, Kel-F, and 18-8 stainless steel. According to the manufacturer, they won't stick or gall, and are designed to allow precision control and recording of settings.

With these valves, all contact with liquids is restricted to corrosion-resistant plastic materials. The exterior of the valve is also resistant to corrosion from fumes, splash or immersion. Positive shutoff is assured.

Chemtrol Corp.

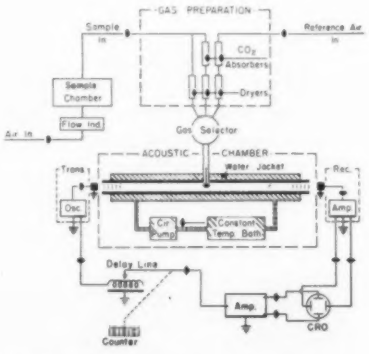
2. Gas vent system

A new gas vent system from Dura-Vent Corp. has been designed to meet three important objectives: ease of installation, low wall temperature, and durability.

The new vent is a double-wall metal pipe suitable for type B (standard type appliances) and type BW (recessed wall heaters) installations. It is available in both round form, in sizes from 3 to 12 in., and in 4-in. oval.

A simple snap-type locking mechanism makes it possible to join or unjoin round or oval sections without tools. The inner wall of 0.016-in. aluminum is surrounded by a stiff outer wall of 28-gauge galvanized steel to give rigidity and to resist damage in handling. Air space between the two walls is continuous from one pipe section to the next, allowing a natural draft of active air to keep the outer wall cool.

Dura-Vent Corp.

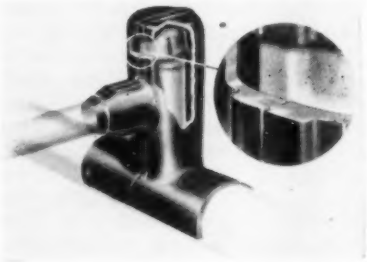


3. Gas analyzer

Monitoring of gas mixtures by continuous or batch control, the detection of minute amounts of harmful gases in pollution or personnel safety problems, vapor and gas chromatography, and the study of isotope concentration in certain gases are a few of the applications of a new Sonic gas analyzer from National Instrument Laboratories.

This new analyzer employs the velocity of sound and offers exceptional range, sensitivity and rapidity of analysis. It exploits the wide differences in sonic velocity by achieving such measurable sensitivities as 0.005 per cent of oxygen in air and 0.00061 per cent of hydrogen.

National Instrument Laboratories



4. Plastic service tee cover

Modern Utility Supply Co.'s new service tee cover provides permanent corrosion prevention for service tees.

The cover is made of rigid high impact polystyrene. It does not deteriorate under ground and will completely resist all soil stresses. The cover comes in two halves with a wedge-designed tongue and groove for joining the two halves. A solvent cement is brushed on the tongue and groove with the two halves of the cover placed around the tee, and the tongue forced into

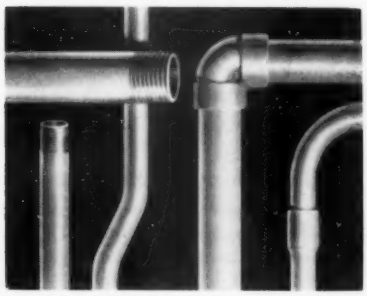
the groove. A wide strip of tape is placed on the bottom of the main and brought up over the saddle sides of the cover. Tape is then spirally wrapped over each end of the saddle, back to and over the coating on the main.
Modern Utility Supply Co.

5. Bell and spigot sealer

A new E-Z Poxy method for repairing leaking bell and spigot joints has been announced by A & H Engineering Co.

The new process consists of venting the leakage to allow a tough epoxy resin compound to harden and firmly bond to the leaking surface. The final seal is made by plugging the vent hole after the E-Z Poxy resin has hardened.

According to the manufacturer, the method has been successfully tested for more than three years. It provides a permanent, time-saving method of repair which is easy to apply. The method and material are available for all joint sizes in a packaged kit with instructions.
A & H Engineering Co.



6. Rigid PVC pipe

Easton rigid (unplasticized) PVC pipe is now available in all standard pipe sizes from ¼-in. to 6-in. The pipe's resistance to chemical and electrolytic corrosion, and its immunity to attack by sour crudes and salt water, make it suitable for pipelines, gathering lines, and numerous off-shore uses.

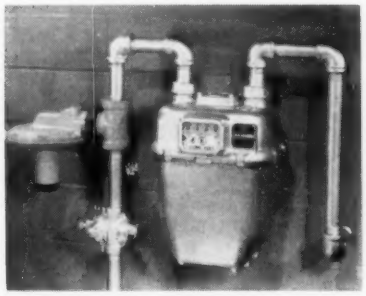
Easton PVC pipe and tubing is precision-sized to close tolerances, and is dimensionally stable. Easily worked and assembled, it can be sawed, threaded, welded, cemented, machined and formed with conventional equipment. It has a tensile strength of 5500 to 7000 psi.
Easton Plastic Products Co.

7. Storage system

The A-138 Alcoa aluminum alloy storage system that was designed to help solve various storage problems in installing or maintaining hot water supply in commercial applications is being marketed by Ruud Manufacturing Co.

This new development consists of a 155-gal. aluminum alloy tank, mounted on a base that is 2½ in. high, and enclosed with heavy insulation within a steel jacket that has a baked enamel finish.

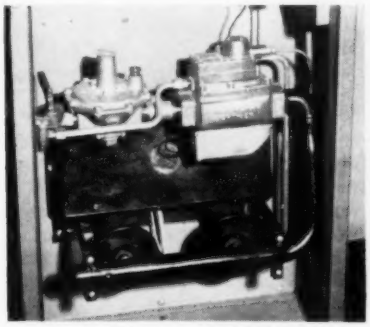
As shown in the accompanying photo, the A-138 can be secured as a package with the new Ruud AS 20-80 Sanimaster gas water heater, thus augmenting the small water capacity of the new high input commercial water heater.
Ruud Manufacturing Co.



8. Service regulator

Rockwell Manufacturing Co. has almost doubled the relief capacity of previous service regulators in its new light-weight, internal relief service regulator.

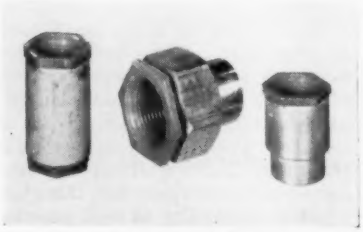
Available with die-cast aluminum upper and lower diaphragm cases, the new Rockwell 143 regulator combines light weight with the advantages of 360° swivel design and a number of new safety and operational features, including (1) direct upward venting through the spring housing when internal relief valve is open; (2) spring housing design which provides a large vent area, with no small restricting orifices to retard flow; (3) large passages on either side of the I-beam construction at the regulator throat allow any pressure build-up to be quickly transmitted to the lower diaphragm case.
Rockwell Manufacturing Co.



9. Heating unit control

Robertshaw-Fulton has developed a new automatic control for use on high-capacity gas home heating units—units with ratings up to 200,000 Btu/hr.

The control, designated HC-E, includes in one unit a positive snap-action gas valve, an automatic pilot with the 100 per cent shutoff feature, and a built-in pilot filter. Suitable for use with all room thermostats, the HC-E control utilizes a new type valve actuator as the thermo-element. The valve actuator is a short, electrically insulated rod made of high strength alloy, which expands and controls "on call" from the room thermostat.
Robertshaw-Fulton Controls Co.



10. Dielectric couplings

A new line of nylon-insulated dielectric couplings and unions from the May Co. has been designed for iron pipe connections. The cou-

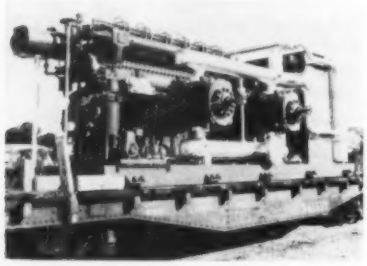
plers are available in both straight and reducing types, sizes from ⅜-in. to 2-in. Unions are for both flare and solder copper pipe connections, primarily for domestic water heater installations.

May Co. recommends use of the insulated fittings wherever dissimilar metals are joined, to prevent electrolysis. The nylon bushings used in the fittings are an easily identified red in color and are durable enough to withstand pressures up to 100 lb and continuous temperatures up to 230°F.
May Co.

11. Plastic pipe, tubing

Rigid (PVC) and flexible (polyethylene) pipe and tubing is being produced by Marken Plastics Corp., manufacturer of extruded plastic products and custom extrusions.

A complete range of sizes from ⅜ in. to 4 in., with all types of fittings, will be offered.
Marken Plastics Corp.



12. Engine compressor

Worthington's new turbocharged gas-engine compressor, the SLHC, is available in the medium horsepower range—330 to 880 hp. The newly designed unit is reportedly the only gas-engine compressor in its class size that has been turbocharged.

Turbocharging is the key feature of the SLHC. The turbocharger, deriving all of its energy from otherwise wasted exhaust gas, compresses ambient intake air to an elevated pressure for cylinder charging. This results in a greater power per unit space and therefore greater portability as well as economy.

The compressor—available in 4, 5, 6, 8, and 10 power cylinder combinations — is designed for gas gathering, pipeline and distribution service; in natural gasoline plants; for pressure maintenance in oil fields; for various oil refinery operations; refrigeration systems; and in the petrochemical industry where various processes require the use of gas under pressure.
Worthington Corp.

13. Air and gas trap

Condensate is discharged from compressed air or gas lines by a combination of magnetic, pneumatic and automatic action in the Mag-Pneu-Power trap recently developed by Hankison Corp.

Magnetic snap-action operates the pilot valve and pressure energy in the pneumatic system drives the piston which opens and closes the main discharge valve. There are only two moving parts in the entire trap: the float arm, which opens the pilot valve, and the piston assembly, which opens the main discharge valve. The trap has a pressure range from 10 to 200 psig.
Hankison Corp.

TRADE LITERATURE

14. Domestic meter bulletin

A new, completely revised bulletin (No. 1083, Rev. 2) covers the entire line of Rockwell domestic gas meters. The 24-page bulletin describes for the first time all four Rockwell single-joint domestic gas meters, including the recently introduced "250" and "310." The bulletin is illustrated with photos and line drawings.
Rockwell Manufacturing Co.

15. Regulator bulletin

Fisher Governor Co.'s four-page bulletin (C-655) describes the Series 655 self-operated regulators. These regulators are used on a wide variety of industrial applications where it is desired to control the pressures of water, steam, oil, gas, or other fluids. They are also used as air-operated shutoff valves.
Fisher Governor Co.

16. Sealant folder

Epocast, a material that may be trowelled, squeezed or spread on metal, wood, plastic, rubber, ceramic concrete, or glass for edge fillers, sealants, packing joints, porosity seal, patching, splining, and caulking is described in a new folder. Produced by Furane Plastics Inc., the pastes may be machined, sanded or drilled after setting or hardening, and after the addition of a catalyst or hardener.
Furane Plastics Inc.

17. Header bulletin

Fluor Products' cold extruded multiple outlet headers are described in a new two-color bulletin. The company's process of cold-extruding natural gas, refinery and chemical plant components from alloy and carbon steel is discussed, as is the wide variety of components available.
Fluor Products Co.

18. Cathodic protection brochure

Good-All Electric Manufacturing Co.'s line of cathodic protection rectifiers has been described in a new brochure. Discussed is the choice of particular types of cathodic protection rectifiers, based on many factors, including accessibility of proposed location, environment, power available, and characteristics of load. Systems covered include the custom line, add-a-stack, oil-immersed, Type N, and Gemco, a low-cost, medium-duty, air-cooled, general purpose machine.
Good-All Electric Manufacturing

19. Emergency lighting system

A new centralized emergency lighting system that constantly supervises itself has been developed by Standard Electric Time Co. and is described in a new publication from the company. The new emergency lighting system not only reports—by flashing lights and buzzers—any fault to the system, but even sounds an alarm when an emergency lamp is removed from its socket. In operation, the system is instantaneous and fully automatic. Emergency lights go on the instant regular power fails and go off when power is restored.
Standard Electric Time Co.

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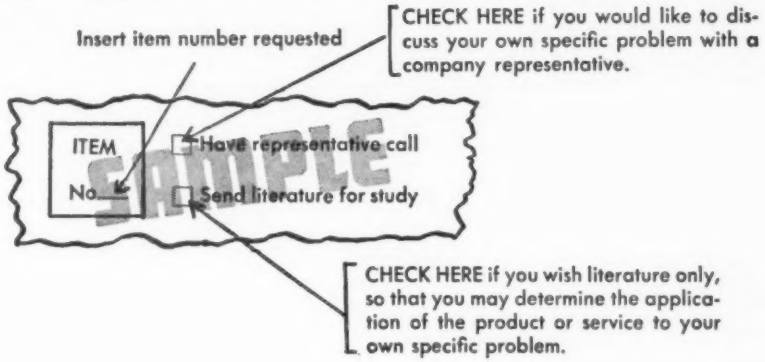
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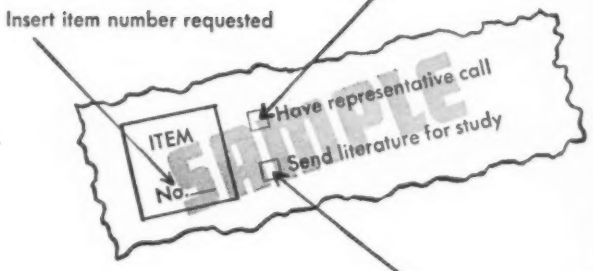

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GAS Digest • *Cont'd.*

20. Instrument catalog

"Pipe Locators—Leak Detectors" is the title of the Fisher Research utility catalog for 1957. Described is the M-Scope electronic instrument line, including M-Scope pipe finders, two new transistorized leak detectors, a completely new line of transistorized corrosion control instruments, and water well testing equipment.
Fisher Research Laboratory

21. Plastic pipe data

Engineering data and specific information on installations using Busada Butyrate plastic pipe are presented in an illustrated brochure from Busada Manufacturing Corp. Busada Butyrate pipe is made of selected cellulose acetate butyrate compound supplied by Eastman Chemical Products.
Busada Manufacturing Corp.

22. Remote counter bulletin

Bristol Co.'s Bulletin A128 describes the company's remote integrating counter for use with pneumatic transmission systems. The 7-digit counter receives its signal from a measuring transmitter which operates on an impulse duration system. Since the electric signal transmitted is a function of time, line voltage variations do not affect the accuracy of the counter.
Bristol Co.

23. Combustion controls

A new catalog on combustion controls and instruments, representing a single source of information covering a complete line of automatic controls and instruments for the combustion industry, is available from General Controls. The new catalog covers everything required for a complete combustion installation. According to the manufacturer, this is the first time a complete and standardized line of combustion instruments and controls has been cataloged under one cover.
General Controls Co.

24. Valve guide

Lunkenheimer Co. has revised its reference work, "Guide for Selecting Valves, Boiler Mountings, and Lubricating Devices." New sections describing bronze globe valves with Brinalloy seats and discs; PVC all-molded valves, and solder end valves have been added to the 24 pages of tables, technical data, and information.
Lunkenheimer Co.

25. Processing brochure

A 28-page brochure covering services of Syd E. Culbertson Co. has been published. Included are descriptions of coating and wrapping, hydrostatic testing, threading and coupling, beveling, welding, API drifting, straightening, and storage of pipe at the supplier's Houston plant.
Syd E. Culbertson Co.

26. Rate analyses booklet

"The One-Step Method of Bill Analysis" is a booklet from Recording & Statistical Corp. which describes the company's method of improving the speed and accuracy of rate analyses for utility companies.
Recording & Statistical Corp.

When Overloads *STRIKE*
Gas Transmission or
Distribution Line Scrubbers . . .

. . . Aerotec Dry Gas Scrubbers easily handle it without loss of efficiency.

Up to 100% overload can be handled by Aerotec Gas Scrubbers while still maintaining normal efficiency. Some of the features which contribute to the wide acceptance of these unique and outstanding scrubbers are:

Delivery of gas, free from dust and liquid carryover.

Small size for equivalent volumes as compared to conventional types.

Simplicity of installation and operation.

Convenient manifolding to any capacity.

Contact our Project Engineers for information and aid on your gas cleaning problem.

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At Your Job Site:

With Modern Portable Plant Equipment

Phone: ELizabeth 4-5200

PIPE PROTECTION SERVICE INC.

715 Elizabeth Ave.

Elizabeth, New Jersey

GAS people

John Clennon
Peoples Gas

Carl Hokenson
Peoples Gas

Several top level promotions have been announced by Peoples Gas Light & Coke Co., Chicago. CARL HOKENSON is now general superintendent of the distribution department, succeeding E. G. CAMPBELL, who is being transferred to an inactive status for reasons of health after 36 years of service with the company. Mr. Campbell will be available for counsel as distribution advisory engineer. JOHN B. CLENNON, formerly supervisory engineer in the engineering department, is now assistant superintendent in the transportation department. ROY B. MUNROE is now assistant to the vice president in charge of sales. JAMES J. CONDON succeeds him as manager of domestic sales, and VINCENT D. FORTUNATO has been advanced to manager of commercial sales, Condon's former position.

WILLIAM F. KRUEGER has been appointed manager of pipeline sales for Dresser Manufacturing division, Bradford, Pa. Among his chief duties will be the development of new Dresser products for the pipeline industry. New general markets sales representatives for Dresser are EDWIN O. STAFFORD, who will work out of Houston, covering the Texas Gulf coast area; ROBERT J. HANSON, who will headquarter in Chicago and cover the midwestern

William Krueger
Dresser

Edwin Stafford
Dresser

ANESITE® CUSTOM TUBING

KRALASTIC OR TENITE

EASIER TO HANDLE

EASIER TO INSTALL

WILL NOT RUST, ROT OR CORRODE

CUTS COSTS

Here is today's practical answer for both new and replacement services—ANESITE plastic tubing, custom-built to your specifications. Right down the line, this quality custom tubing gives you the kind of performance that saves time, work and money.

The men on the job prefer to handle ANESITE because it's so light, so much easier to handle and install. Its flexibility makes it a simple matter to push through old services without kinking. Fewer joints are needed because ANESITE is flexible. Joints are easier to make up. No special tools, no flame, no heat required. And ANESITE will not rust, rot or corrode. You'll be pleased with its savings, too.

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3573 W TOUHY AVE.
CHICAGO 45, ILLINOIS
AND
PLASTIC PIPE & TUBE
Division of ANESITE COMPANY
224 S. MILPAS STREET
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Member, Thermoplastic Pipe Division of the Society of the Plastics Industry, Inc.

Robert Hanson
Dresser

George Stineback
Polyken

Rubin Reddin
Stuart Steel

Orville Cochran
Rockwell

states; and M. C. CLELAND, whose territory is composed of Texas, Oklahoma and Arkansas.

GEORGE C. STINEBACK, general sales manager of Polyken Industrial Tapes, has been advanced to director of sales of the Chicago division of the Kendall Co. He will be responsible for all marketing operations of Polyken, Bauer & Black, Bike Web, Blue Jay, Andrews-Alderfer, and Bauer & Black International, which comprise the Chicago division. JAY HODGES, who has been field sales manager of Polyken for the past three years, will take over the responsibility of general sales manager.

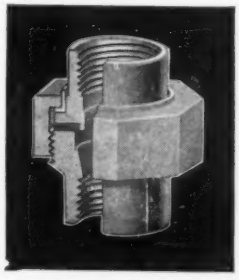
The board of directors of Delaware Power & Light Co., Wilmington, has elected R. B. RICHARDSON vice president in charge of operations and FRED T. BEAR vice president in charge of engineering. HAROLD W. CLIFT has been appointed operating manager and CHARLES W. MINICH is manager of gas operations, succeeding Mr. Clift. Succeeding Mr. Minich as superintendent of the gas distribution department is CARL R. ROEHM.

Utility Appliance Corp., Los Angeles, has named LEO HUNGERFORD director of sales engineering for its entire line of products. Former sales manager for southern California, Mr. Hungerford has been with Utility Appliance for the past 17 years.

RUBIN C. REDDIN has been appointed regional representative for Stuart Steel Protection Corp., Plainfield, N. J. He will headquarter in Columbus, Ohio, and will cover Ohio and adjoining states.

Rockwell Manufacturing Co.'s meter and valve division has expanded its Denver, Colo. branch office into a full district office and has promoted ORVILLE COCHRAN, branch manager, to district sales manager. Mr. Cochran joined Rockwell in 1922. WILLIAM T. KIEHL JR., assistant to the executice vice president, has been made general manager of the newly created insurance department. GEORGE SCHAEFER, formerly on the staff of Rockwell's Nordstrom valve plant in Oakland, Calif., has been named assistant to Mr. Kiehl.

H. E. BRAMSTON-COOK has been elected a member of the board of directors of Oronite Chemical Co., San Francisco. Mr. Bramston-Cook, now vice president of the company stationed in New York, will be responsible for industry relations and for coordinating company policies



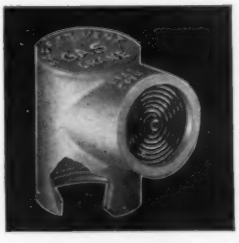
New
CRANE Malleable Iron
Insulated Union

Gives cathodic protection at meters—Galvanic corrosion in service piping can be effectively reduced by cathodic protection at meter connections. This rugged, malleable iron Crane union breaks the current path by means of special insulation.

Between union ring and tail-piece there's an L-shaped washer of laminated phenolic thermosetting plastic. Between tail-piece and thread-piece a thick black rubber gasket breaks the metal-to-metal contact. Both insulating parts have high dielectric strength.

New union measures just slightly longer than the regular ¾-inch Crane malleable union—approximately 2-7/32 inches, end to end. Packaged in cartons of 30.

Check your Crane Representative on these items!



New ¾-inch Safety Vent Elbows

A flexible stainless steel coil spring takes the place of the old bar grille or rigid screen in this new Crane vent elbow. Keeps out bugs, insects, foreign matter. Flexes outward if regulator is vented. Durable, dependable —die cast of zinc alloy.

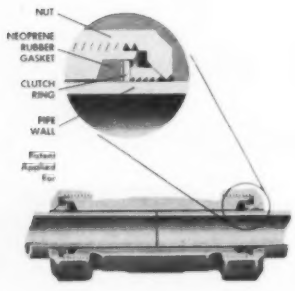
CRANE

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

for the THRIFTY BUYER

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Telsco
Compression Fittings
conduct electricity
without bonding!



When you count the cost—in time and money — of bonding every single pipe connection you make, it's smart to look for other ways of conducting electricity.

A *Telsco Compression Fitting* gives you a connection that conducts electricity without bonding. Here's why:
The *Telsco Clutch Ring* bites firmly into the pipe, serving as a conductor.

At the same time the *Neoprene Rubber Gasket* is forced against the body of the fitting, and inward against the pipe, sealing against gas leaks.

So if you'd like to get *out* of the "bonding" business, and *into* the business of getting more installations done quicker, ask for the rest of the Telsco story.

Tilgis

TELSCO FITTINGS DIVISION
5420 REDFIELD STREET DALLAS 35, TEXAS

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TUFFITE KITS
for
Corrosion Control
↓ CATHODIC ↓
PROTECTION
↑ ELECTROLYTIC ↑

- Tuffite Bushings
- Tuffite Gaskets

Complete standard kits for 150 lb. flanges to 2,500 lb. flanges.

Also available, special design flanges.

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258 Broadway
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Proved by USE!

Works in seconds! Loosens Rusted Bolts
nuts, screws, "frozen" parts . . . . without breakage!

LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!

7 BASIC BLENDS

TiteSeal
GASKET & JOINT SEALING COMPOUND

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
- HEATPROOF AND VIBRATION-PROOF

Get them from your Automotive, Hardware or Plumbing Wholesaler!

RADIATOR SPECIALTY CO.
Charlotte, North Carolina

people • *Continued*

in eastern United States. Other Oronite personnel shifts include the appointment of N. E. HATHAWAY to the new position of general sales manager in San Francisco; J. R. STITT to coordinator of marketing, replacing Mr. Hathaway, and T. M. WELTON to eastern regional sales manager, succeeding Mr. Stitt.

Two organizational changes in the sales department of Connecticut Light & Power Co., Berlin, Conn., have been announced. QUENTIN Q. QUINN, an industrial sales engineer at Waterbury, is industrial sales manager, filling a vacancy created by the death of H. W. Memmott. ROBERT S. BROMAGE, rate engineer, has been named assistant to the sales vice president. In addition to his new duties, he will continue his rate activities. At the same time the company promoted LAWRENCE M. DURYEE, an industrial sales engineer, to the newly created post of western division industrial sales manager with headquarters at Waterbury.

BENJAMIN C. BETNER JR., formerly vice president in charge of Continental Can Co.'s Shellmar-Betner division, has been appointed vice president in charge of sales for Continental's glass and plastics divisions. RAY C. SCHENK, formerly control officer of Continental Can, has been appointed general manager of the Shellmar-Betner division.

HORACE SINGLETON, special assistant to the general manager of Robertshaw-Fulton Controls Co.'s aeronautical division, has been made an assistant vice president of the company.

PAUL E. BEECH is the newly appointed dealer relations manager of the Peoples Natural Gas Co., Pittsburgh. The former director of employee training in the personnel department will have primary re-

Quentin Quinn
Connecticut Light

Robert Bromage
Connecticut Light

Charles Stang Jr.
Maxitrol

Joe S. Davis
Southern Union

sponsibilities of evaluating dealer activities and aiding division sales personnel in stimulating dealer sales of gas appliances.

JOE S. DAVIS has been appointed general sales manager for Southern Union Gas Co., Dallas. In this newly created position, Mr. Davis will be responsible for supervising the company's expanding sales program.

ANDREW T. FISCHER has been named marketing director for Logistics Research, Redondo Beach, Calif.

CHARLES STANG JR. has been elected vice president-engineering by Maxitrol Co., Detroit. Mr. Stang has been chief engineer for the past four years. His activities will now be expanded into policy formulation and direction of company affairs, as well as research and development.

Following final consolidation of American Tractor Corp. into J. I. Case Co., MARC B. ROJTMAN, former president of American, was elected to the newly created position of executive vice president and general manager of J. I. Case. He will have authority over and responsibility for the overall operation of the newly merged company. In addition, he has been elected to the board of directors and will serve on the executive committee. Two other members of the former

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American-Case

Paul Beech
Peoples Natural

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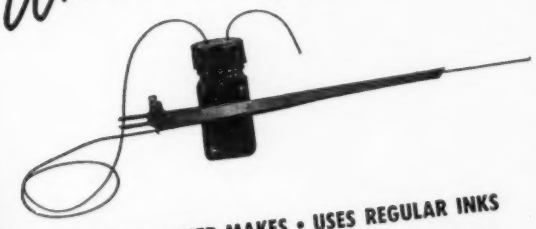

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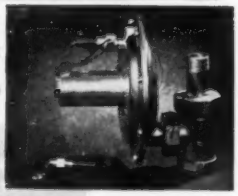

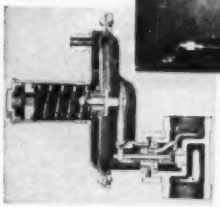

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people • *Continued*

American Tractor board, MENTOR KRAUS and EDWARD ELLIOTT, have also been elected to the Case board.

BOYD S. OBERLINK, group vice president of Allis-Chalmers Manufacturing Co., Milwaukee, has been elected to the board of directors. ARCHIE D. DENNIS is now assistant secretary and assistant treasurer and PICKENS JOHNSON is assistant secretary.

The Permaglas division of A. O. Smith Corp., Kankakee, Ill., has named W. T. HALKET general sales manager of water heating products and J. W. BURLESON general sales manager of heating and air conditioning products. Both men have been assistant general sales managers since February 1956.

HERBERT D. CLAY has been elected executive vice president of Iroquois Gas Corp., Buffalo. Other changes resulting from the merger of Republic Light, Heat & Power Co. into Iroquois include HOWARD F. MOORE, vice president; HUBERT P. NAGEL, assistant secretary; and ROY W. CARD, assistant treasurer.

Ebasco Services Inc., New York, has appointed ROBERT S. QUIG manager of the company's rate department. He was formerly assistant manager of the department. G. ROGERS PORTER is now a consultant in the firm's sales and public relations consulting department.

PAUL A. GRAY has been named to the newly created post of commercial services director of San Diego (Calif.) Gas & Electric Co. He will supervise the activities of the order, investigation, and appliance repair departments. Other appointments include TRUITT P. RICHARDSON to staff assistant, commercial services department; CHARLES R. BARCLAY to order department supervisor; FRED J. WRIGHT to investigation department supervisor; ALAN J. MCCUTCHEON to cooperative wiring supervisor; and RICHARD E. FARWELL to customer extension planning supervisor, San Diego area.

WILLIAM J. KEEGAN has been elected president of Holly Manufacturing Co., a division of the Siegler Corp. J. STANLEY JOHNSON, former Holly president, is chairman of the operations planning committee of Siegler's board of directors

and of that company's new product development division.

ROBERT G. DEE has been appointed general sales manager of the ElectroData division of Burroughs Corp., Pasadena, Calif. The company has also appointed J. F. KALBACH field engineering manager.

Phillips Petroleum Co., Bartlesville, Okla., has made the following appointments in its natural gas department: R. B. STEWART, manager; DAN L. MAYER, formerly general superintendent of the department, to assistant manager; M. H. CULLENDER, director of the engineering division; and JOHN HORN, assistant director of the gas sales division.

Equitable Gas Co., Pittsburgh, has appointed THOMAS P. MURPHY supervisor of public relations and WILLIAM G. VAN GILST general superintendent of compressing stations. Mr. Murphy has been with Equitable for three years as a dealer relations and commercial sales representative. Mr. Van Gilst has been assistant general superintendent, and succeeds Judson Bonsall, who died recently. Mr. Van Gilst will headquarter in Clarksburg, W. Va.

EARL ERICH has been appointed sales manager of Tube Turns Plastics Inc., Louisville, Ky. Mr. Erich joined the company in 1955 and in January 1956 was made assistant sales manager.

FRANK F. ELLIOTT has been succeeded as president of Crane Co. by NEELE E. STEARNS. Mr. Elliott is now chairman of the board of directors. Before assuming his new duties, Mr. Stearns was vice president for planning and development of the Inland Steel Co. Mr. Elliott joined Crane in 1922 as a sales engineer in the Los Angeles branch. After filling a similar post in San Francisco, he served as assistant manager and branch manager there and was named western district manager in 1943. He moved to Chicago as vice president in charge of branches in 1951 and became senior vice president of sales in 1952. He became president in June 1955.

MELVIN M. SPERO has been appointed supervisor of the tabulating division of New York State Natural Gas Corp.'s general accounting department.

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people • *Continued*

Ohio Fuel Gas Co., Columbus, has named RICHARD T. HESS Cambridge division manager and E. D. GODFREY, former New Lexington manager, has succeeded him as Mt. Vernon manager. The company has also named BERNARD S. REED superintendent of motor transport in the Cambridge area. He was formerly Cambridge manager.

THOMAS D. BROMLEY has been elected president of the Dura-Vent Corp., Redwood City, Calif. For the last 10 years, Mr. Bromley has been vice president in charge of sales of Peerless Manufacturing Corp., Louisville, Ky., a position he continues to hold.

RICHARD G. SCHULTZ is district supervisor in New York state and some provinces of Canada, according to Heath Survey Consultants Inc., Wellesley, Mass. He will headquarter in Batavia, N. Y.

Deaths

PHILIP T. DASHIELL, retired vice president of the Philadelphia (Pa.) Gas Works, died recently. He was 77. Mr. Dashiell joined PGW in 1899, transferred to the Public Service Corp. of New Jersey, but returned to Philadelphia in 1913. He was vice president of the company at the time of his retirement in 1947. For his technical work in the field of gas manufacture, Mr. Dashiell was awarded the AGA's Beal medal in 1931, the Walton Clark medal of the Franklin Institute in 1932, and the AGA's distinguished service award in 1948.

RALPH D. STAUFFER, president, director and chief engineer of the NEGEA Service Corp. and chief engineer of the New England Gas & Electric Association subsidiary companies, died recently. He was elected president of NEGEA, Cambridge, Mass., in April 1956. He had served as chief engineer for the system since 1941.

HOWARD W. MEMMOTT, industrial sales manager of the Connecticut Light & Power Co., Berlin, Conn., died recently of a heart attack. Before his appointment in 1951 as CL&P's industrial sales manager, Mr. Memmott served for many years as industrial sales engineer for the Danielson district and later for the company's entire eastern division.

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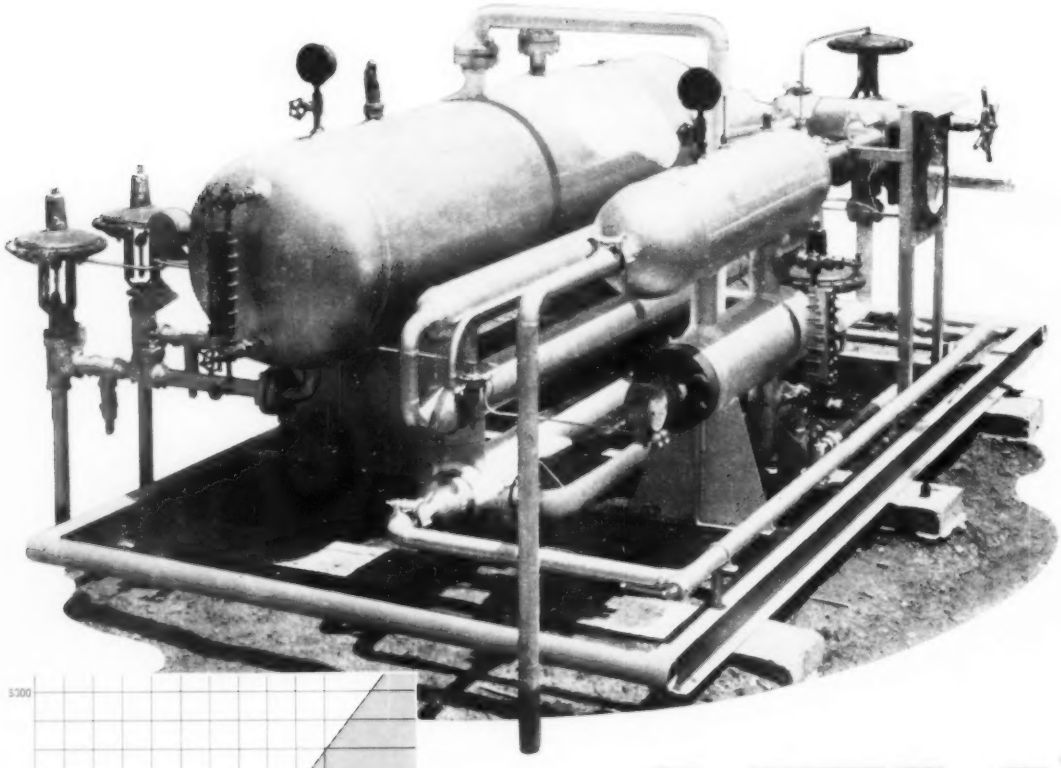

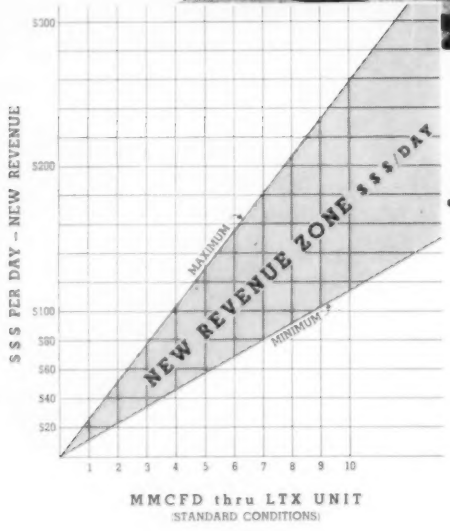

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GAS exclusive

El Paso Natural operates vast communications system

By DON WRIGHT • Managing Editor

EL PASO NATURAL GAS CO. operates the most miles of pipeline, sells the most gas, and operates the most extensive communications system in the western United States.

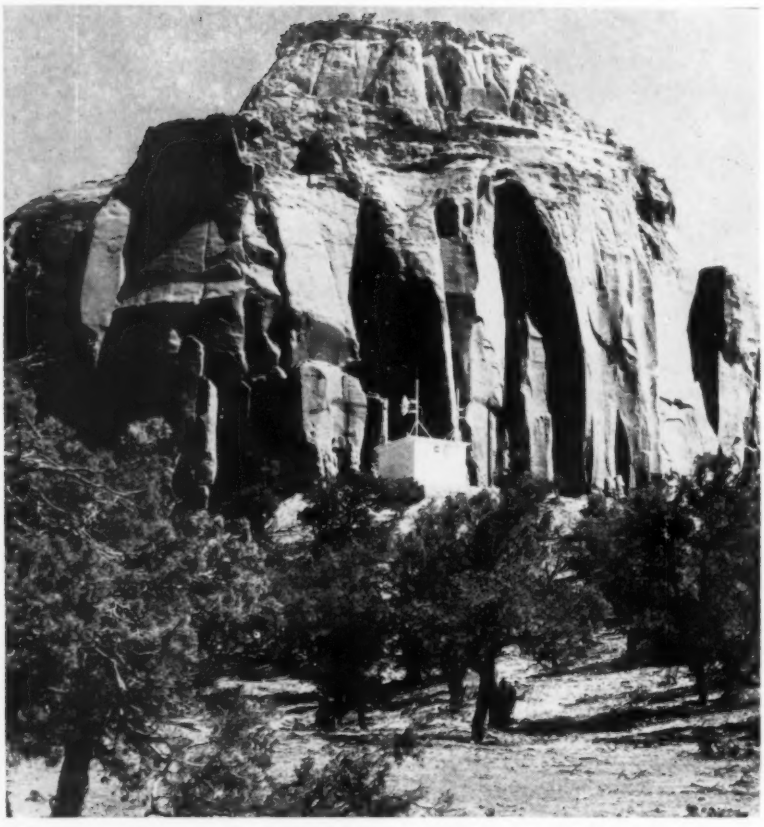
El Paso Natural is the prime supplier of natural gas for California, and the sole source for Arizona, most of New Mexico and parts of west Texas. To meet the demand of these fuel-hungry areas, the company must operate its pipeline system at near capacity around the clock.

The average U. S. pipeline operates at an approximate 70 per cent average. El Paso's system has an average load factor of 91 per cent. To operate at this high load factor, the company needs an efficient pipeline and a communications system that can be counted on at all times. It has both.

When a high-pressure, long-distance line is operating at maximum pressure, communications between all points on the line must be instantaneous. Dispatchers must be notified when any change will occur which will affect pipeline pressure.

Contact between all points on the El Paso Natural system is maintained through a vast communications network that is an efficient amalgamation of microwave and both private and lease wire line circuits. This network stretches over

Typical microwave station serving the Permian division of the El Paso Natural Gas Co.



El Paso's microwave repeater station on Sugar Loaf mountain, near El Paso.

El Paso's 1334 miles of pipeline right-of-way from Topock and Ehrenberg, Ariz., at the California-Arizona border to Midway Lane in El Paso's west Texas production fields. Through this combination of microwave and wire line, dispatchers in El Paso can keep in constant touch with any point on any part of the company's lines. Hub of the communications network is located at the company's El Paso city gate station, a few miles from the headquarters building in downtown El Paso.

El Paso's first venture into communications began in 1928, when it installed a private wire line from its headquarters to Jal, N. M., paralleling a then-new 16-in. OD pipeline. This original line was designed solely for voice communications—today, the entire system is still designed for voice. It also carries teletype channels, but whenever voice contact cannot be made between points, the system is considered out.

Although the system is designed primarily for voice communications, the company makes extensive use of party line teletype using tone off-on equipment. Teletype is used by the dispatching department for pressure reports and operating orders.

This communications system was designed and is operated primarily for use of the dispatcher for the movement of gas. Naturally, it is also used for other company business. But the dispatcher has first priority, and several channels are reserved for the exclusive use of the dispatching department.

El Paso makes only limited use of remote control by its communications system. Two remote regulators—one at a power plant in El Paso and the other in Phoenix—are operated by wire line.

The El Paso pipeline network is made up of two separate sets of lines running from gas-producing fields in west Texas, New Mexico and Colorado to the Arizona-California border. The southern system—oldest of the two—brings gas from the Permian Basin to California. This line runs through the flat lands of west Texas, southern New Mexico and southern Arizona to the Colorado river. Here, at a point midway between the California and Arizona banks of the Colorado, Southern Counties Gas Co. (Los Angeles) takes delivery and transports the gas into heavily populated southern California.

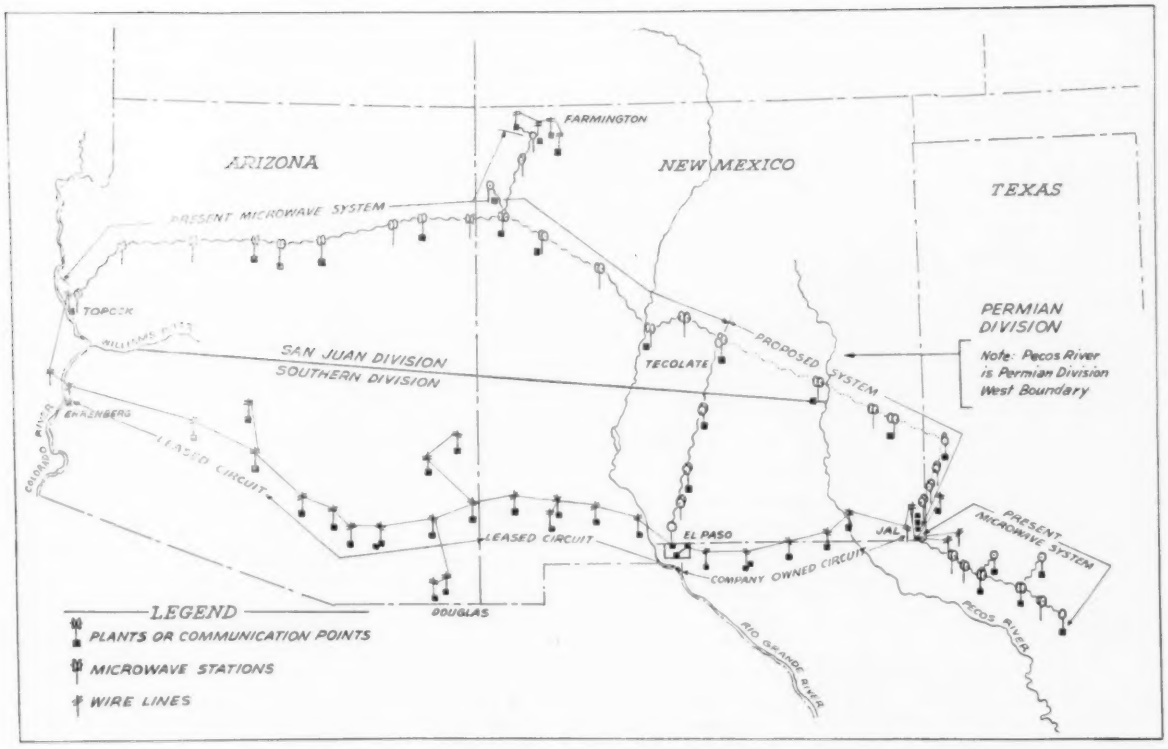
The northern route carries gas from the rich San Juan basin. It runs through New Mexico and into the rugged mountainous territory of Arizona, crossing the expansive Navajo reservation. The pipeline terminates at Topock, where Pacific Gas & Electric Co. buys the gas (again at a midway point across the Colorado river) and transports to San Francisco and other cities throughout its huge distribution territory in central and northern California. Soon, Southern California and Southern Counties Gas companies will complete a line to Topock, and begin buying gas there for distribution in their areas.

Two separate types of communications systems serve these two pipeline routes. The southern system is served by leased wire line, running from El Paso to Ehrenberg, and then northward into California and back into Arizona to Topock.

The northern route presented a much more difficult problem for El Paso's communications department. This line runs through endless miles of remote wilderness. There are no telephone lines serving many of the regions. Hence, El Paso was faced with two alternatives: build its own communications facilities, or, do without.

The company could ill afford to do without. In its early years of operation, El Paso built its own private wire lines into remote areas. But, maintenance was a definite problem. Another hazard was the weather. In 1948, a heavy winter snow storm knocked out 23 miles of the private line between El Paso and Jal, N. M. The line was out for three days, and El Paso dispatchers got a thorough education in operating a pipeline by guesswork.

Now, the chances of a three-day outage between any points on the



El Paso maintains communications between stations through this system of microwave and wire lines.

line are practically nil. El Paso and Jal are still connected by a private wire line. But a new microwave link soon will be built from Jal to Tecolote, N. M., where it will connect with existing microwave facilities.

When this link is completed, all points on the system will be protected. If a wire line should go out, calls can be rerouted over microwave and be received through the back door, so to speak. The system will be almost 100 per cent foolproof.

El Paso installed its first microwave system in 1951. The first link connected the company's San Juan river plant (N. M.) with Topock, Ariz. This link provided communications between Topock, Flagstaff and Navajo station, Ariz., and San Juan river plant and Farmington, N. M. Actually, this microwave system was augmented by two sections of wire line: 16 miles of wire line connected the actual Topock Camp with Topock terminal station, and an 8-mile wire line connected Farmington with the San Juan river plant terminus. These two private wire lines are still a part of the system.

In 1953, the company installed a microwave system in its Permian division, and a year later equipped its North Permian division with a microwave link from El Paso to Farmington.

El Paso has recently rebuilt much of its microwave system. The Permian division system, originally installed in 1953, has been modified and expanded to meet increased traffic requirements. Here the company has installed RCA CW20A microwave transmitters and receivers, Setco multiplexing equipment, Prodoline antennas, and Emsco towers.

This Permian network is made up of 13 stations. Originating at Jal, it runs the route of 223.9 miles of El Paso pipeline southeastward to Midway Lane in Crockett county, Texas. Longest jump on the system is 29.1 miles between Jal, N. M., and the TXL field plant near Notrees in west Texas. Shortest hop is 7.8 miles between TXL and Goldsmith, Texas.

The Permian system is made up of nine channels: eight voice and one TWX. Voice channel drops are provided at Jal, N. M., and Goldsmith, Sealy Smith, McElroy Crane, Sweetie Peck, Midkiff, Plymouth and Midway Lane, all in Texas. A party line channel provides drops at Jal, TXL and Goldsmith.

The El Paso microwave system operates at 1855-1895 Mc. Multiplex carriers have a 1 Kc guard band. The voice channels are of the single sideband, suppressed carrier type.

The Permian division has complex operating problems caused by the large number of gas sources. One of the primary functions of the microwave system is the telemetering of these gas flows to division dispatchers at Jal, N. M. Bristol Metameter telemetering equipment, utilizing Setco tone equipment, is used to telemeter line pressure data.

At present, the Permian microwave system is tied in to the rest of the system by wire line from Jal to El Paso. It soon will tie in with a new microwave link running from Jal to Tecolote, N. M., where it will join existing microwave facilities. This new link, to be built soon, will be made up of nine new stations,

Telemetering receiving instruments at El Paso station provide dispatchers with pressure and differential data.

and will be designed along the same lines as the present Permian division.

All voice channels terminate on switchboards. Unlike normal switchboard circuits which have two-wire termination, the El Paso installation uses four-wire tones with carrier and strapping over provisions. Conventional Bell dispatching channels could not be used because of the greater number of specialized instruments necessary.

The North Permian division microwave system joins El Paso's headquarters with its processing plants in Farmington, N. M. It stretches over 430 miles of rugged territory. This network is made up of 12 stations, starting at the El Paso city gate. The longest hop between any of the company's repeater stations is found on this system, 83 miles between Grants, N. M., and Mountainair, N. M. This link traverses some high mountains (elevation—5000 ft or more in some places), which makes possible the great distances between many of the repeater stations.

A tie-in at Wingate station, N. M., joins the North Permian system with the San Juan division system, and furnishes a through path to the Arizona-California border sales station at Topock, Ariz.

The North Permian system carries seven voice channels, a service channel, three TWX channels and a fault alarm channel to the Farmington terminal, where they are multiplexed.

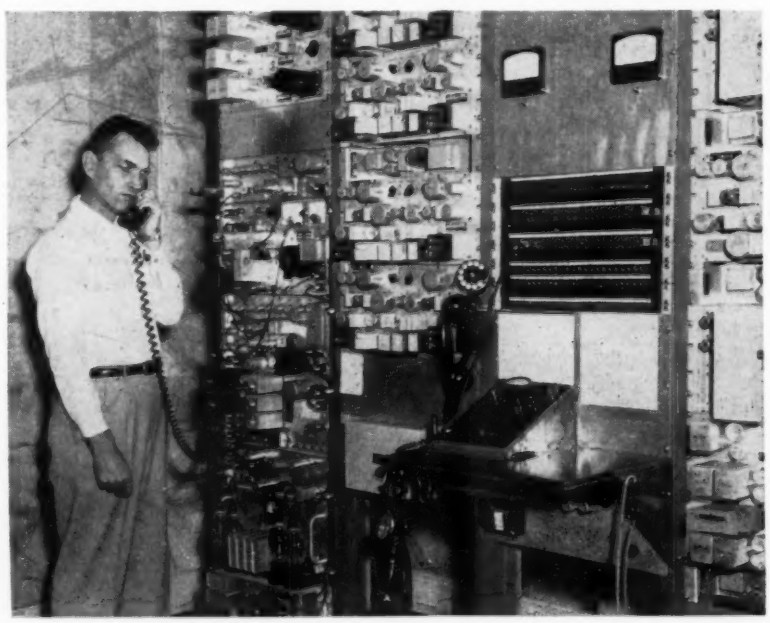
The San Juan division microwave system has been undergoing a modernization program, too. Some of the original equipment has been moved to other locations, and the sites of some of the original repeater stations have been changed. The system from Wingate, N. M., west to Williams, Ariz., has RCA CW20A transmitters and receivers; the other stations use Philco equipment.

The company's pipeline right-of-way runs over some hazardous country on its way to the Colorado river. Heavy winter snows in the Arizona mountains ruled out any thought of private wire lines, and no common carrier had lines strung in many of the places they were needed when the pipeline went in. Microwave was, and is, the answer.

Nine repeater stations beam the microwave along the route of the pipeline. The beams carry a service channel, a dispatcher's voice channel, and three fault alarm channels. These fault alarm channels are used to report any malfunction at individual microwave repeater stations.

El Paso's San Juan division microwave system is unique in many ways. Instead of using the customary steel towers (found elsewhere on the company system), the microwave dishes are mounted on 40-ft wooden poles. Stations are located on mountain peaks, hence the high towers were not needed. These high mountains also make possible several long hops between repeater stations—81 miles between Dilkon and Mt. Eldon repeater stations in Arizona, and 70 miles between Mt. Floyd and Hualpai Peak, also in Arizona.

Two company-operated VHF base stations are tied-in to the microwave system in the San Juan division. These are at Topock Camp



Ed Ekola, communications engineer, contacts remotely located station by handset operating on microwave system.

Company built own access roads to mountain top locations such as this microwave repeater station at Oro Grande.

L. G. Wainman, superintendent of communications, contacts other stations on the microwave system using service channel handset.

and at Williams, Ariz. This makes it possible for personnel at El Paso, or any other point along the communications system, to carry on a conversation with mobile equipment operating within the range of these two VHF stations.

The microwave system has recorded only two fades since it went into operation. Both were recorded in the Permian division, and both were caused by the same thing: extended periods of absolutely calm weather on the flat lands of west Texas. Light refraction temporarily put the microwave system out of operation. The turbulent air on the desert and mountain areas of Arizona and New Mexico — which plague wire lines—has just the opposite effect on microwave.

Standby power facilities are provided at all microwave systems. Prime power is furnished by the company's own compressor stations whenever and wherever possible. When company-generated power is not available, El Paso buys from REA or a public utility. Several stations on the San Juan system have no available power supply. Here El Paso makes its own power, using single cylinder diesel engines belted to 5-kw generators.

Standby gasoline engines and Onan generators are set to cut in automatically if the prime power source should fail.

El Paso's communications department, headed by L. G. Wainman, superintendent of electrolysis and communications, designs and installs all of its own facilities.

Whenever a repeater station is located at a company compressor installation or other company facility, it is incorporated into the buildings. However, many of the repeater stations, mainly in the remote areas of the Arizona mountains, are unattended. These unattended stations are constructed of cement block, and house the microwave equipment, standby power equipment, and emergency replacement supplies, such as tubes, etc.

In many instances, El Paso had to build its own access roads to the repeater stations. Some of the Arizona mountain top stations are practically isolated during winter months, being accessible only with the use of heavy snow equipment.

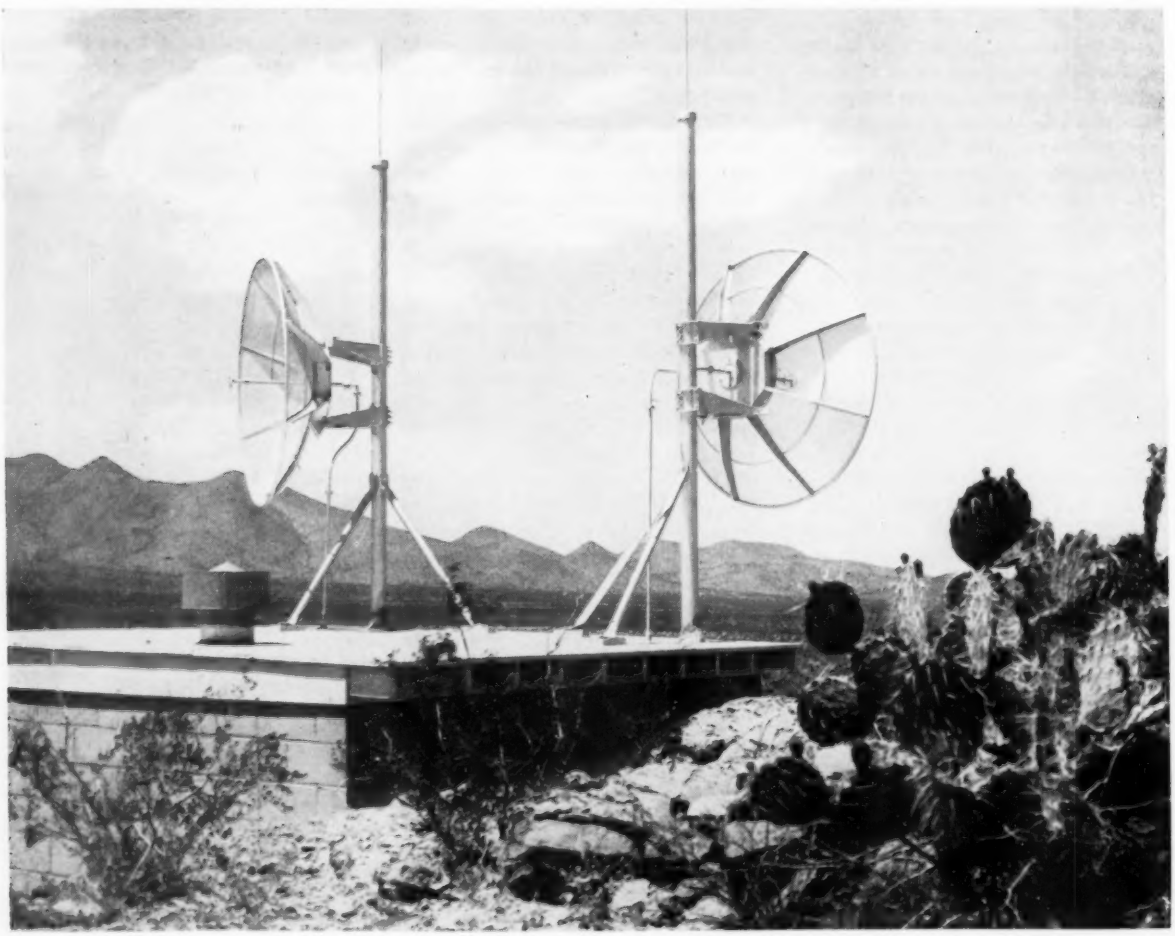
El Paso's communications department performs regular inspection and maintenance work on its communications system. However, the company does not have a regular program of periodic overhaul. Mr.

At this field compressor station at Leupp, Ariz., microwave antennas are mounted on roof of building.

Wainman says that experience has shown them that the best policy is to leave the equipment alone when it is functioning properly. When it shows signs of wear, it is taken out of service and completely overhauled.

One of the company's biggest maintenance problems has been caused by sour gas in the Permian division. This sour gas caused corrosion on the microwave cavities at the stations near the production fields.

The original microwave equipment installed at these locations had cavities plated with silver, and were quite susceptible to sour gas corrosion. The company then experimented with gold, without much more success. Now, they are plating the cavities with rodium, and the sour gas corrosion problem is apparently licked. ■



A closeup view of the antennas at the Oro Grande repeater station on the El Paso Natural microwave system.

Corrosion control with plastic tape

PLASTIC tape coating for corrosion prevention graduated from the experimental stage and use on small diameter pipe when a 122-mile stretch of American Louisiana Pipe Line Co.'s system was wrapped with polyethylene-base protective tape coatings.

American Louisiana experimented with the coating on a 10-mile length of 30-in. line in Tennessee before contracting for the job which connects its mainline near Defiance, Ohio, with the Michigan-Wisconsin Pipeline Co.'s line in southwestern Michigan.

Two spreads—one from H. C. Price Co. and one from Houston Contracting—did the 122-mile job, each taking half. It took them 35 days to apply the tape wrap to the line, averaging 9100 ft/day. The crews had no trouble keeping up with the welders; at times the welders were hardpressed to keep ahead of the taping crews.

The Polyken tape was applied without a prime coating on the pipe. A cleaning machine cleaned rust and mill scale from the pipe just ahead of the wrapping operation, which sometimes followed as close as 20 ft behind.

The line-travelling tape-wrapping machine is a self-powered unit with two tape spool arms and two outer wrap arms. It applies a spiral wrap with ½-in. overlap. Polyken No. 900 (nominal thick-

Following closely behind the pipe-cleaning machine (left background) is the self-powered machine that wraps pipe in the corrosion-resistant polyethylene.

The tape-wrapping machine with four spools —two for the plastic tape and two for the outer wrapping.

ness 12 mils) was used on the straight stretches of American Louisiana's line. The thickness was increased to 20 mils for river crossings and under highways as well as in areas where swampy conditions were encountered. An outer wrap of John-Manville 8-lb asbestos-felt-reinforced Transhield impregnated with coal tar was used to protect the underwrapping against mechanical damage until the pipe was laid in the ditch.

As the pipe left the wrapping machine, it was allowed to take its natural slope and to come to rest in the ditch. The final cradling operation required when wrapped pipe is temporarily supported on skids was eliminated, and the backfilling tractor did its job immediately after the pipe settled in the ditch.

Quality of the tape application is indicated by the fact that only 15 holidays were spotted in 78 miles

Rust and mill scale are removed from the pipe by the cleaning machine, which runs just ahead of the taping machine.

MAKE KOPPERS YOUR HEADQUARTERS FOR INFORMATION ON CORROSION PREVENTION

The Corrosion Report at the right is the first in a continuing series. Through these Reports, we hope to give you useful, practical information which will be of value in your corrosion-prevention work.

These Reports reflect the many years of experience by Koppers Tar Products Division in the manufacture and successful application of protective coating materials. Though not the answer to all corrosion problems, protective coatings are a useful ally in industry's fight against corrosion.

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how to CUT CORROSION LOSSES

a report by Koppers Company, Inc.

W. E. Kemp,
Manager of the Technical Dept.

Although corrosion losses are never listed on a profit and loss statement, they represent a considerable—and often unnecessary—loss to every industry. Preventing this loss is a big part of our business as the world's leading producer of coal tar base enamels and coatings.

* * *

Many times every week we get a phone call, wire or letter asking the same, often harried, question: "Can you help me with this corrosion problem . . . ?" In most cases, we *can* help, and are most happy to do so. In fact, our Coal Tar Technical Department is designed to facilitate such help.

Basically, we have two groups within the Technical Department—the Development Group and the Technical Service Group. They are both headquartered at Verona, Pa., in a new building with the latest facilities for laboratory work and pilot plant operations. This building also houses the Quality Control staff of the Tar Products Division. These ten chemists cross-check the quality control operations of each plant.

Our Development Group consists of a General Supervisor, Mr. Frank Charlton, and two project leaders who supervise the activities of nine chemists and engineers. They work constantly to up-grade the effectiveness of Bitumastic coatings and to develop new coal tar coatings.

Our Technical Service Group, supervised by Mr. C. U. Pittman, also includes two project leaders and four laboratory workers. These men work in close liaison with our customers, distributors and sales engineers to help them specify the best coating and the most economical application for the job.

We also retain the services of two widely-known coating and corrosion scientists: Dr. W. F. Fair, Jr. and Mr. R. C. Stromquist. Both of these men—and each member of the Technical Department supervisory staff—have had more than 20 years' experience in the bituminous coating field. Dr. Fair and Mr. Stromquist work with all departments and, through first-hand field experience in their extensive travel, alert us to customer needs for new or modified protective coatings.

* * *

Naturally, many of our technical personnel participate quite actively in industrial and technical organizations. One of our coatings consultants, Dr. W. F. Fair, Jr., actually served full time last year as president of the National Association of Corrosion Engineers. Altogether, 70% of our men are members of scientific and technical societies. They participate actively on committees working on industry-wide problems.

In future columns, we plan to report to you on specific corrosion problems in such industries as steel, gas, petroleum, water supply and sewage and industrial wastes. In the meantime, we'd like to hear about your problems. Write to Koppers Company, Inc., 1301 Koppers Building, Dept. 117C, Pittsburgh, Pa. In Canada, Koppers Products, Ltd., Toronto and Edmonton.

KOPPERS

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COATINGS AND ENAMELS

After it has been wrapped, the pipe is allowed to take its natural slope and to come to rest in the ditch, eliminating long stretches of pipe resting on skids before lowering-in. The wrapping operation is followed closely by the backfilling tractor.

by the Pearson detector operated after the pipe was buried and backfilled. The electronic detector which followed behind the wrapping machine seldom found more than five holidays per mile. As a result, there were no patching crews as such. Men from the tape gang put on patches where they were needed.

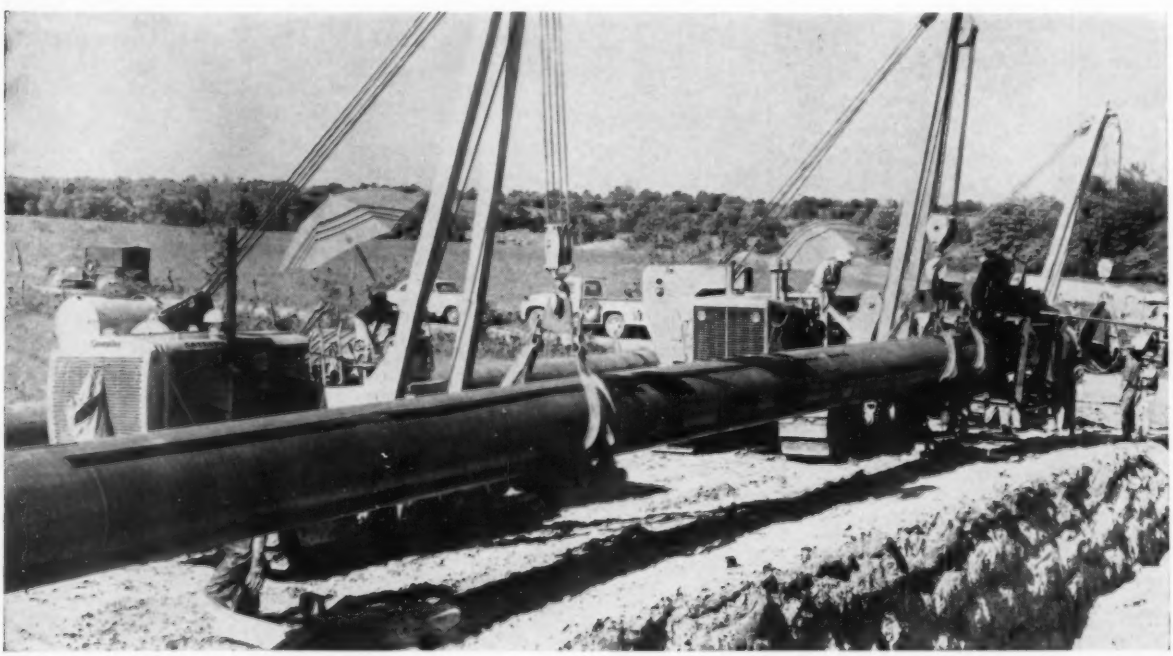
The patching operation in itself is quite simple. The asbestos outer wrap is cut away and a patch of the adhesive tape is stuck on directly over the spot. For a pinhole, a 3- to 4-in. square is ample to complete the repair, with a 2-in. lap on either side of the tear found ample to insure full protection.

Before the pipe is wrapped, the longitudinal seam is covered by strips of black tape to prevent the weld upset from cutting the spiral wrapping.

Polyken's protective tape coating was originally designed for electrical insulation purposes, but its unusual electric resistance, moisture barrier, and chemical resistivity led to its experimental use as a pipeline coating. Initially, these products were used on small diameter pipe where their versatility was of primary importance or where unusual corrosive conditions existed.

Following several years of intensive experimental applications on small diameter pipe, the possibility of using the tape on larger diameter pipe arose. In early 1954 a 12-mile, 8-in. line test at Seadrift, Texas, made it clear that power-driven application equipment would be essential in order to establish the full economic benefit to be found in the Polyken protective coating method. Subsequently, the Remco wrapping machine, similar to the one used on American Louisiana's line, was developed.

A series of municipal gas distribution system installations followed the development of the machine (see *Gas*, October 1954). At the same time, larger diameter pipe tests were set up, culminating in May 1956 in the successful power wrapping of the Tennessee section of American Louisiana's line, followed shortly by the 122-mile job. ■



Low-cost DURATAPE guards pipeline joints, slashes application time in the field

Now save up to 37% on pipeline-joint wrapping with L·O·F Glass Fibers' economical Duratape wrap. Duratape costs less to buy . . . less to apply . . . provides better protection for steel gas and water pipelines.

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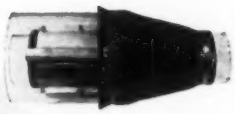
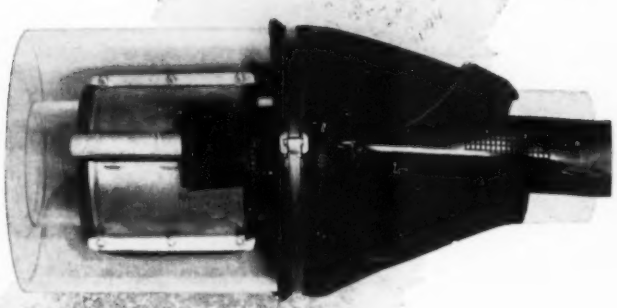
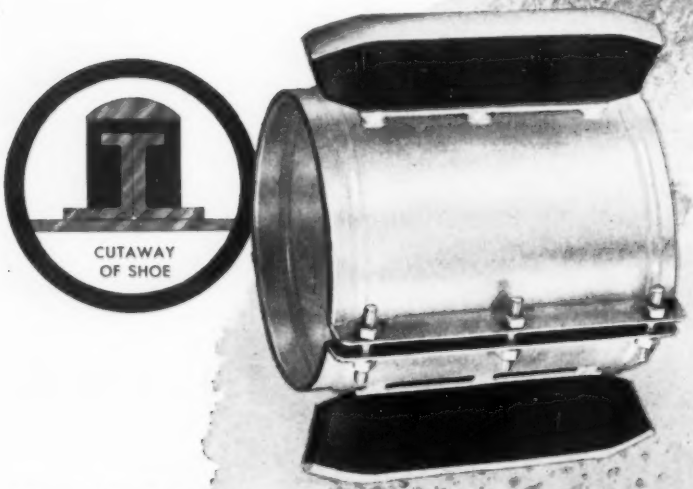


Maloney Casing Seals

Zipper or Slip-on

All neoprene used in the Maloney Seal (and insulator) is live resilient rubber. It is the best rubber that can be compounded.





The Maloney Model 55 Crossing Insulator

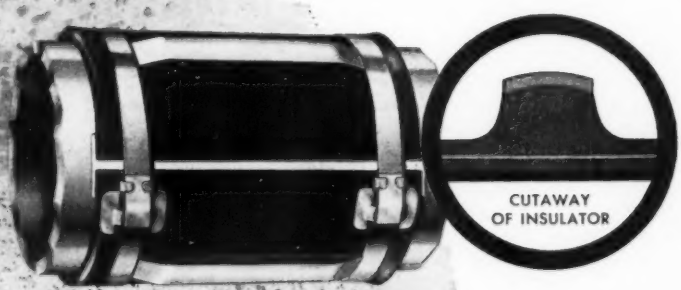
For all Sizes of Pipe

These insulators have superior insulation qualities because of the low moisture absorption and the long life compounded into the neoprene. The wide steel, sled type runners make installation easy. The extra wide band affords a positive grip. Bonded metal-to-neoprene-to-metal, the runner insulates and also permits flexibility to compensate for pipe shifting. Ribbed neoprene lining can be furnished if desired.

The Maloney Model 56 Casing Insulator

Manufactured in sizes from 2" through 12"

Manufactured with neoprene, which is vulcanized to the steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with neoprene and is bonded under heat and pressure to give the same strength as on army tank tread blocks.



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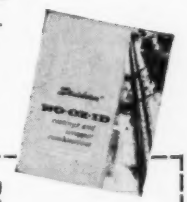

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Protecting Metal Against Corrosion for 70 Years

Advantages of internal in-place coating

In recent years, internal in-place coating has proved to be a valuable method for corrosion prevention for both old and new pipelines. This method can be used on old lines without removing the pipe from the ground.

By A. C. CURTIS, President
Pipecote Service Co., Tulsa

INTERNAL corrosion has long been a serious problem. Millions of dollars have been spent in combating this problem. Even from the beginning at the steel mills, while awaiting shipment, an active campaign of corrosion takes place. After the pipe is put into operation, additional corrosive elements rapidly take form.

An active campaigner in the corrosion field is hydrogen sulphide which viciously attacks the metal surface, and leaves in its wake, debris that reduces the efficiency of the line, and causes contamination of the product. Other allies of hydrogen sulphide also take an active part in forming a formidable force, constantly attacking bare metal surface. These combined corrosive elements have pitted and eaten away literally thousands of miles of pipelines and hundreds of storage tanks and vessels. Left behind was, of course, their debris. Together, they were able to constrict and reduce the efficiency of pipelines, and cause expensive contamination problems also.

Plastic coatings today cover a wide field, and offer protection against these corrosive elements wherever they may be found. Catalytic setting epoxy resin coatings have been developed for application with the in-place method, as well as spray coating of drill pipe, tubing, casing, and other installations where a highly corrosion resistant material is needed. With a critical steel shortage facing us today, we must, of necessity, take heed to any and all protective measures to conserve our steel installations.

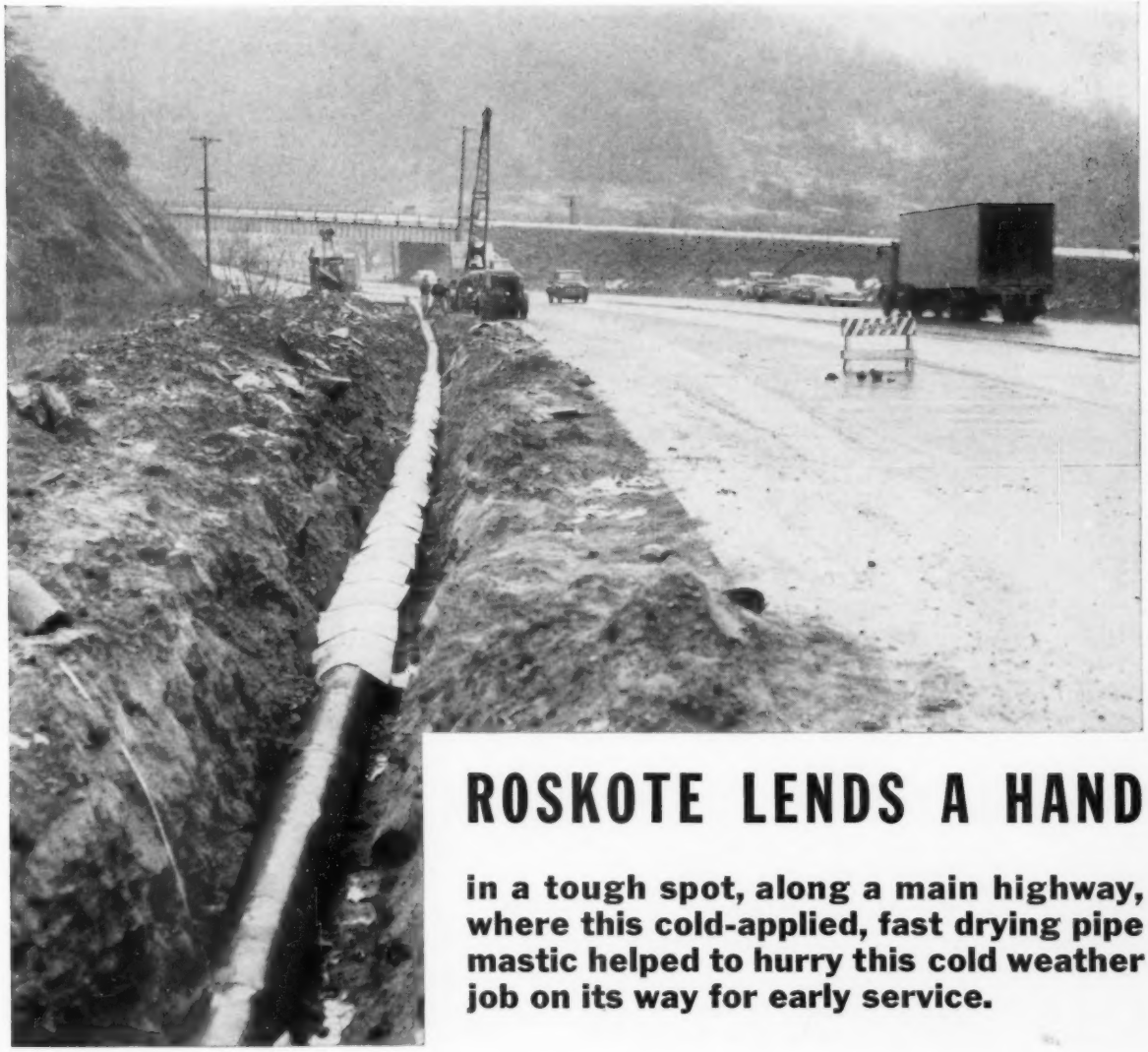
In 1947 a method of coating pipelines internally, in-place, was introduced to the pipeline operators in the highly corrosive sour gas and crude area in the Permian basin of west Texas. This process has gained recognition rapidly, and this service now is being offered to pipeline operators throughout the United States. Numerous advantages are offered by this in-place coating method:

1. *Old lines* already in service can be cleaned and coated internally without removing the pipe from the ground, extending the life of the installation while eliminating high maintenance cost.

2. *New lines* can be coated after installation. This gives an interliner of corrosion resistant materials, continuous from one end of the line to the other.

3. *With the* in-place coating method, high solids, viscous coating materials can be applied to the pipe wall by hydraulic pressure, controlled by air pressure forward and to the rear of hydraulic coating cylinders. The coating film thickness is controlled by the operator controlling the pressure differential.

4. *The in-place* coating method affords the operator greater productivity at less operating expense than is possible with other methods.



ROSKOTE LENDS A HAND

in a tough spot, along a main highway, where this cold-applied, fast drying pipe mastic helped to hurry this cold weather job on its way for early service.

A large portion of Equitable Gas Company's 18½ mile "Delmont Line" of 16" pipe, was laid 3 feet from the edge of U.S. 22. Cold application of Roskote was ideally suited because of limited working space and it accelerated completion of the line. The pipe was given two coats of Roskote Cold Applied Pipe Mastic and a wrapping of felt. Pipe line padding was used where undesirable backfill was present. For complete information on Roskote, with its high resistance to electrolytic and chemical corrosion, write:

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If you've got an underground corrosion problem, Galvomag® magnesium anodes are almost always the best solution.

Galvomag, the Dow high-potential anode that delivers 25% more current than conventional anodes, gives continuous protection to underground equipment—and it's easy on your maintenance budget. These more powerful anodes also provide extra punch and throwing power in high-resistivity soils. In normal soils they insure against corrosion with fewer anode units. Either way, you save on your original investment for cathodic protection.

Contact one of the Dow magnesium anode distributors listed below for detailed information and technical assistance, or write directly to us. THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA 1428JJ.

Call the distributor nearest you: **Cathodic Protection Service, Houston, Texas • Corrosion Services, Inc., Tulsa, Oklahoma • Electro Rust-Proofing Corp. (Service Division), Belleville, N. J. • Ets-Hokin & Galvan, San Francisco, Calif. • The Harco Corp., Cleveland, Ohio • Royston Laboratories, Inc., Blawnox, Penna. • Stuart Steel Protection Corp., Plainfield, N. J. • The Vanode Co., Pasadena, Calif.**

YOU CAN DEPEND ON DOW

5. *Higher efficiencies* can be had on lines coated by the in-place method. The continuous unbroken sleeve of plastic applied to the interior walls of the pipe affords complete insulation of the pipe, giving a polished glass-like finish which substantially reduces the friction factor, and increases the ultimate throughput at any given pressure.

6. *By the use* of the in-place coating method, cleaner products can be delivered because the source of contamination has been eliminated by the continuous plastic sleeve in the pipeline.

7. *Special formulations* of epoxy resins have been developed specifically for the in-place coating method, and are highly resistant to all corrosive elements found in oil, products, gas, water and brines. Because of the in-place application techniques, these coatings have a higher resiliency, a tougher film, and longer life than ordinary coatings.

8. *Special sealing* compounds have been developed to be applied to old coupled lines to seal leaks. By using a new technique of Pipelife method of applying coatings to interior of pipelines in-place, these sealing compounds can be squeezed into the leaking joints, giving a complete seal around the rubber gaskets in Dresser sleeves and leaded joints in bell and spigot pipe. These compounds have a rubber-like resiliency, and a tremendous bonding quality that will allow slippage of pipe in joints without breaking the seal of the compound.

9. *By the use* of highly abrasion resistant coatings applied by the in-place method, the life of pipelines carrying abrasive materials that would cause rapid failure from erosion can be substantially increased.

10. *Longer life* can be had with lighter pipe under both corrosive and erosive conditions by the use of the in-place coating method.

11. *Ordinarily, lines* to be cleaned and coated by the in-place method are temporarily taken out of service. However, by using special stopple and by-pass equipment, pipelines which cannot be taken out of service because of production schedules can be cleaned and coated in 3 to 5-mile sections without discontinuing the flow at any time. For example, 18 miles of 14-in water line was recently cleaned and coated internally, in place, near Carlsbad, N. M., while the pipeline was delivering a minimum of 1650 gal. of water per minute.

This operation has afforded the pipeline owner an immediate savings of over $500,000 against a proposed replacement of the 18-mile line. It has been estimated by company engineers that substantial reductions in pressure and power consumption alone will afford a payout of the entire expenditure of cleaning and coating the 18-mile line in approximately five years, at the same time providing complete internal protection of their original capital investment and maintaining higher efficiencies than are obtainable from new steel pipe.

A "C" factor of 152.7 was obtained on this badly pitted, spiral weld, bell and spigot pipe. Before cleaning and coating, the line was delivering 1650 gal. per minute at a maximum pressure of 300 psi. After cleaning and coating with a maximum pressure of 300 psi the line, on test, would deliver 3250 gal. per minute. The company's requirement at this time is 2000 gal. per minute which is being delivered with a maximum pressure of 165 psi. If increased production were taken into consideration, a payout could be shown on this installation within a matter of weeks.

Combine all of the advantages pointed out that can be obtained from the in-place coating method, and it speeds: (1) conservation of steel; (2) decreased power costs; (3) lower maintenance costs; (4) increased production; (5) less operational hazards, and (6) higher profits. ■

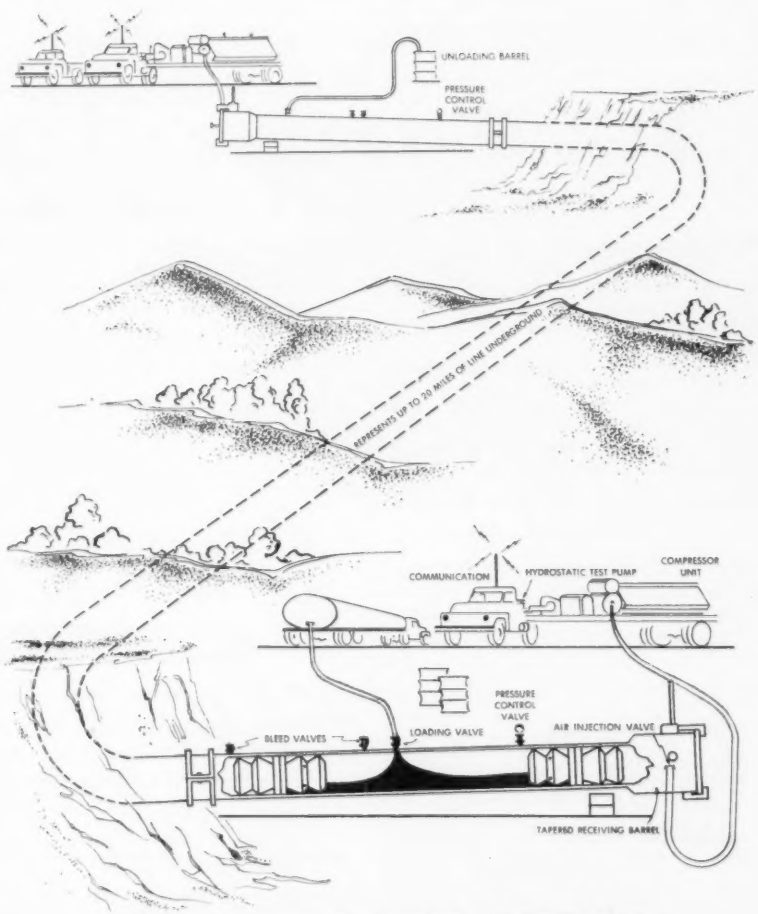
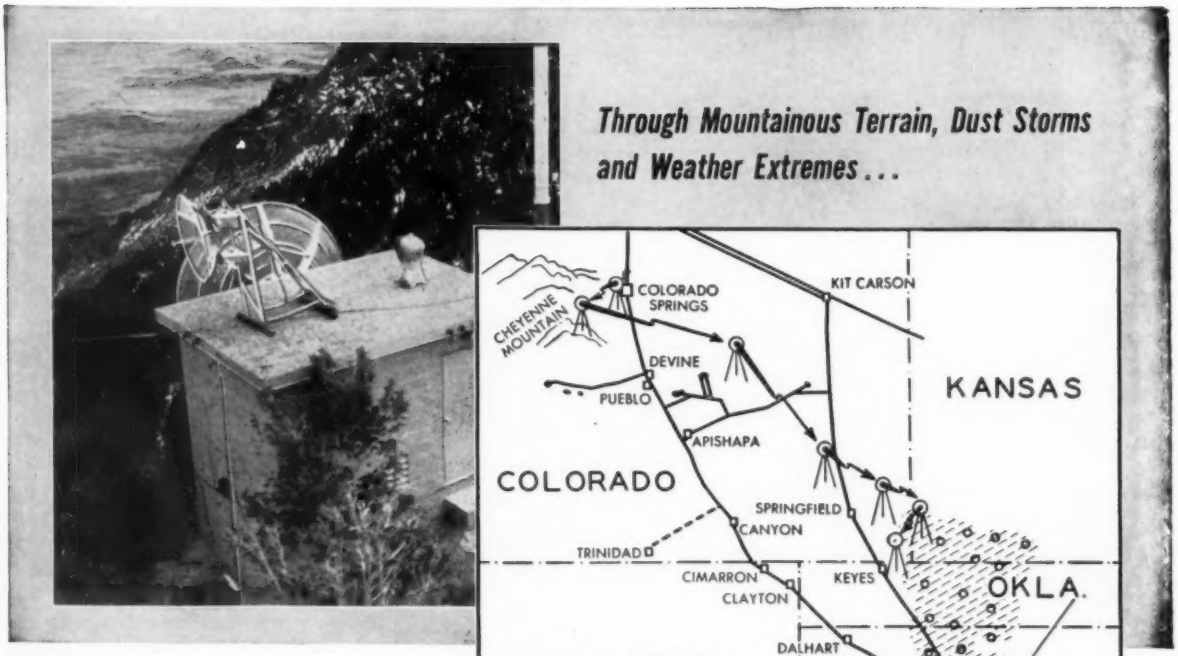


Diagram shows process of coating pipeline internally, in place.



Through Mountainous Terrain, Dust Storms and Weather Extremes . . .

From a point on Colorado's Cheyenne Mountain, the microwave beam is relayed over mountains and prairies alike in its 230-mile swing to gas fields in Kansas and Oklahoma.

RCA Microwave's Dependability

has justified Colorado Interstate Gas Co.'s choice for pipeline communications system

When Colorado Interstate engineers studied communication facilities to connect home office with pipeline compressor stations and with gas-producing fields in Kansas and Oklahoma, they considered wire line, common carrier and microwave. They chose RCA Microwave.

According to W. I. Blount, Superintendent of Dispatching and Communications, "RCA Microwave offered many advantages. It provided relatively easy maintenance, static-free operation and was economically equal to wire line or common carrier. And the more numerous the channels, the cheaper by comparison it became.

"In addition, such a microwave system made it possible to integrate into our already established VHF radio system more stations and mobile units and thus increase the efficiency and scope of our radio system. It offered almost unlimited future possibilities, such as telemetering channels, facsimile, teletype, additional voice channels, remote control of unattended stations and a service channel—all at a relatively small cost."

Only RCA MICROWAVE systems provide so many advanced engineering features. For example, single sideband suppressed-carrier frequency-division multiplex is used exclusively to meet high standards of dependability. Frequency is controlled from the terminal through the entire system.

Microwave specialists will be glad to answer any questions and plan your installation. Mail coupon for further particulars on use of Microwave in utilities, pipelines, turnpike and other applications.

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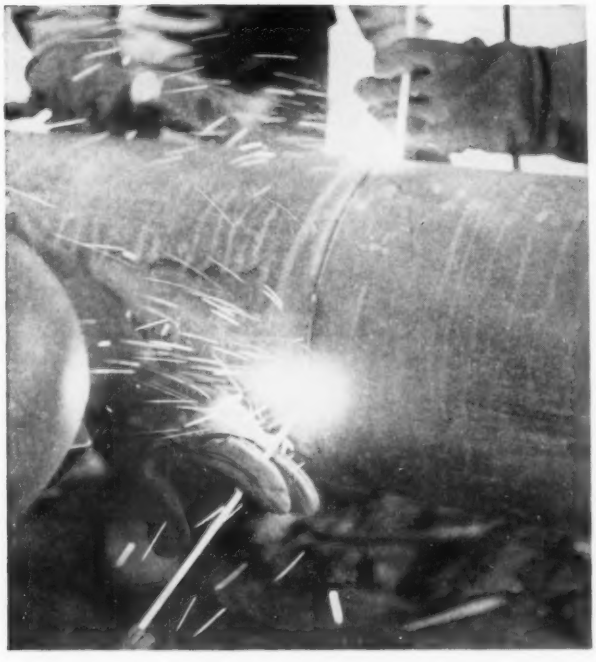


Here are the "Big 5" reasons why Youngstown Electric Weld Line Pipe is your best buy:

1. It bends readily
2. Wall thickness is uniform
3. Line up characteristics are excellent
4. Weldability is outstanding
5. Long lengths save you time and trouble

Why does the welder like to work with Youngstown Electric Weld Line Pipe? The answer is apparent! Youngstown Electric Weld Line Pipe is designed for easy welding. The same physical and chemical characteristics that make for perfection in welding at the mill also contribute to efficient, dependable welding in the field. Freedom from delays in welding, speed up installation of the pipe line—reduces contractors' costs.

Youngstown

ELECTRIC WELD LINE PIPE

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices. - - - Youngstown 1, Ohio.

For effective, long-term protection against corrosion . . .

Close-up of Transhield Asbestos Pipe Line Felt, showing parallel-spaced glass yarns.

Coating and wrapping pipe line to check corrosion and assure long-term service.

. . . use Johns-Manville TRANSHIELD® ASBESTOS PIPE LINE FELT

Johns-Manville Transhield is an economical pipe line felt assuring effective, long-term protection against corrosion under average soil conditions.

Designed for easy, high-speed application by modern machine methods, Transhield is strong and highly tear-resistant. Its light weight permits its use in 800-ft. rolls. This advantage cuts roll changes in half for field wrapping equipment.

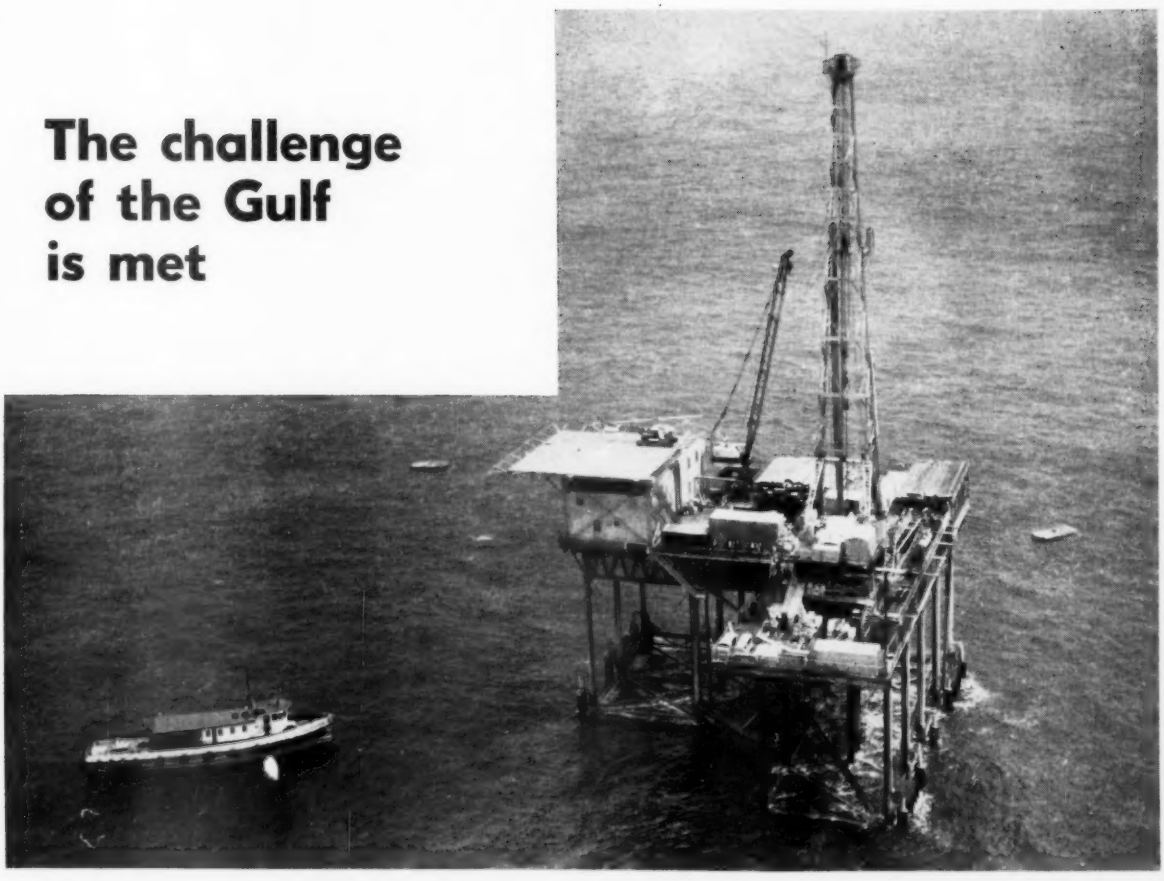
Transhield provides a protective membrane of coal-tar saturated asbestos felt, reinforced with continuous glass yarns parallel-spaced on ¼" centers. It cannot rot or decay, thus acts as an enduring barrier to shield pipe line enamels from earth loads and soil stress.

For severe soil conditions use Johns-Manville #15 Asbestos Pipe Line felt . . . proven in service for over 30 years.

For further information about Transhield, write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, 565 Lakeshore Road East, Port Credit, Ont.

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville** PRODUCTS FOR PIPE LINE PROTECTION

The challenge of the Gulf is met

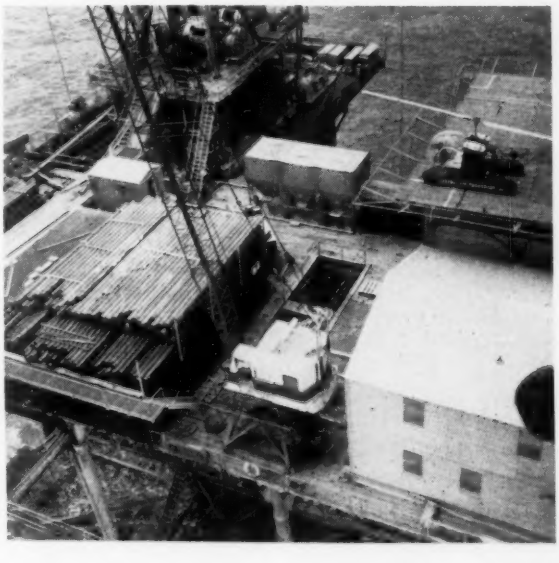


Sinclair's self-contained platform far out in the Gulf is the type most often used for deep-water drilling. It's a double-decker, part of which was used by Texoma Production Co. in its Matagordo operations off Texas. The 16 30-in. OD steel pilings have 195-ft penetration beneath the ocean bed. Moored close by the platform is one of three boats from Sea Service Inc. that service the platform. As shown in the photo below, every inch of floor space is used to best advantage to accommodate the equipment and supplies needed to carry on the operation. Landing deck for helicopters can be seen in right background.

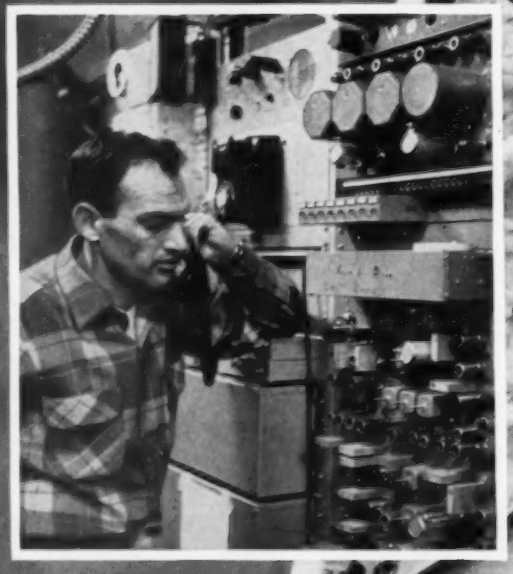
HURRYING to get their share of the huge oil and gas reserves estimated to lie in the Gulf of Mexico are the men making up the crews of the joint project of Sinclair Oil & Gas Co., Sohio Petroleum Co., El Paso Natural Gas Co., and Peoples Production Co.

Nearly 45 miles off Louisiana's marshy coastline in the Eugene Island area, Sinclair, as the operator and holder of one-quarter interest in the project, has its crews and equipment probing the deep waters of the Gulf of Mexico. Getting equipment out over the water, moving crews to and from the job, bringing supplies to the rig, finding ways to get oil and gas to shore—these are all new and costly experiences. High costs are the main reason a number of firms have joined together in this offshore operation.

Sinclair uses the land and the water to keep the operation moving, as shown in the photographs on this and the following pages.



Bonneville depends on



Microwave FOR COMMUNICATIONS TELEMETERING REMOTE CONTROL and VHF CONTROL

a 600-mile microwave system requiring greatest reliability

There's no icing of these microwave dishes—*not even in the snowbound Northwest*—thanks to a newly developed Philco antenna cover, Thermo-Microdome! Complete de-icing . . . a *must* for reliability in any communications system . . . but only one of many features, including diversity, in the microwave installation of the Bonneville Power Administration.

Here are a few of Bonneville's microwave facilities: An extensive telemetering system in Portland, Oregon, control center for the Federal Columbia River generating and transmission system, gives instantaneous readings of voltage, frequency and power produced by five distant dams. Sixteen telemetering channels are carried by a single voice channel for 28 hops—one over 60 miles long. Every station is equipped for ten automatic functions including fault reporting, standby-switching and equipment "status check"!

Philco offers a "complete microwave package": Every item of equipment you may need; experienced system planning; installation and service after the sale. Write Department GA for full details.

Bonneville's custom-built Augspurger microwave station. Durable shelters to house microwave and multiplex equipment, as well as towers, antennas, and reflectors, are available in the Philco product line.

Beside utilities such as the Bonneville Power Administration, Philco has installed extensive systems for leading pipelines, turnpikes, railroads, telephone companies and governmental agencies.

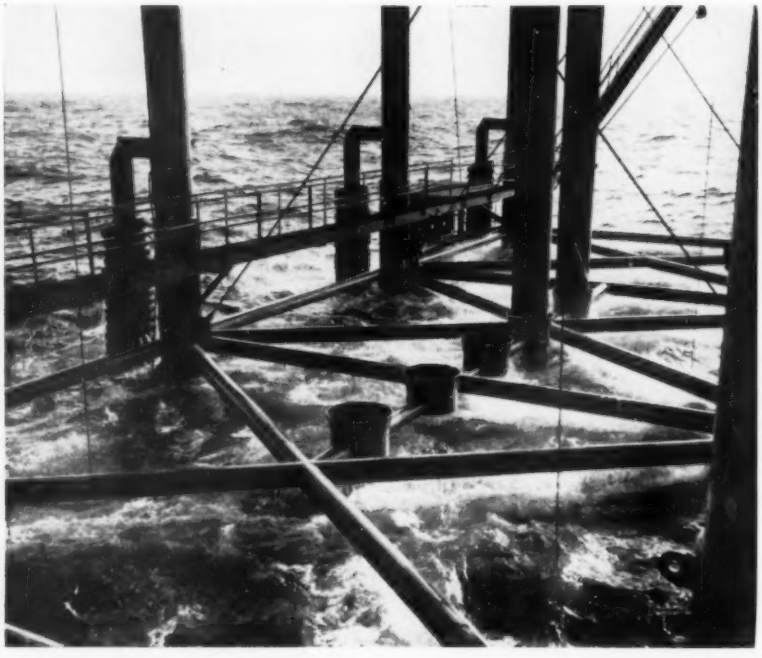
PHILCO—*Pioneer and World Leader in Microwave*

PHILCO CORPORATION

GOVERNMENT AND INDUSTRIAL DIVISION • PHILADELPHIA 44 PENNSYLVANIA

PHILCO Famous for QUALITY the World Over

In Canada: Philco Corporation of Canada Limited, Don Mills, Ontario



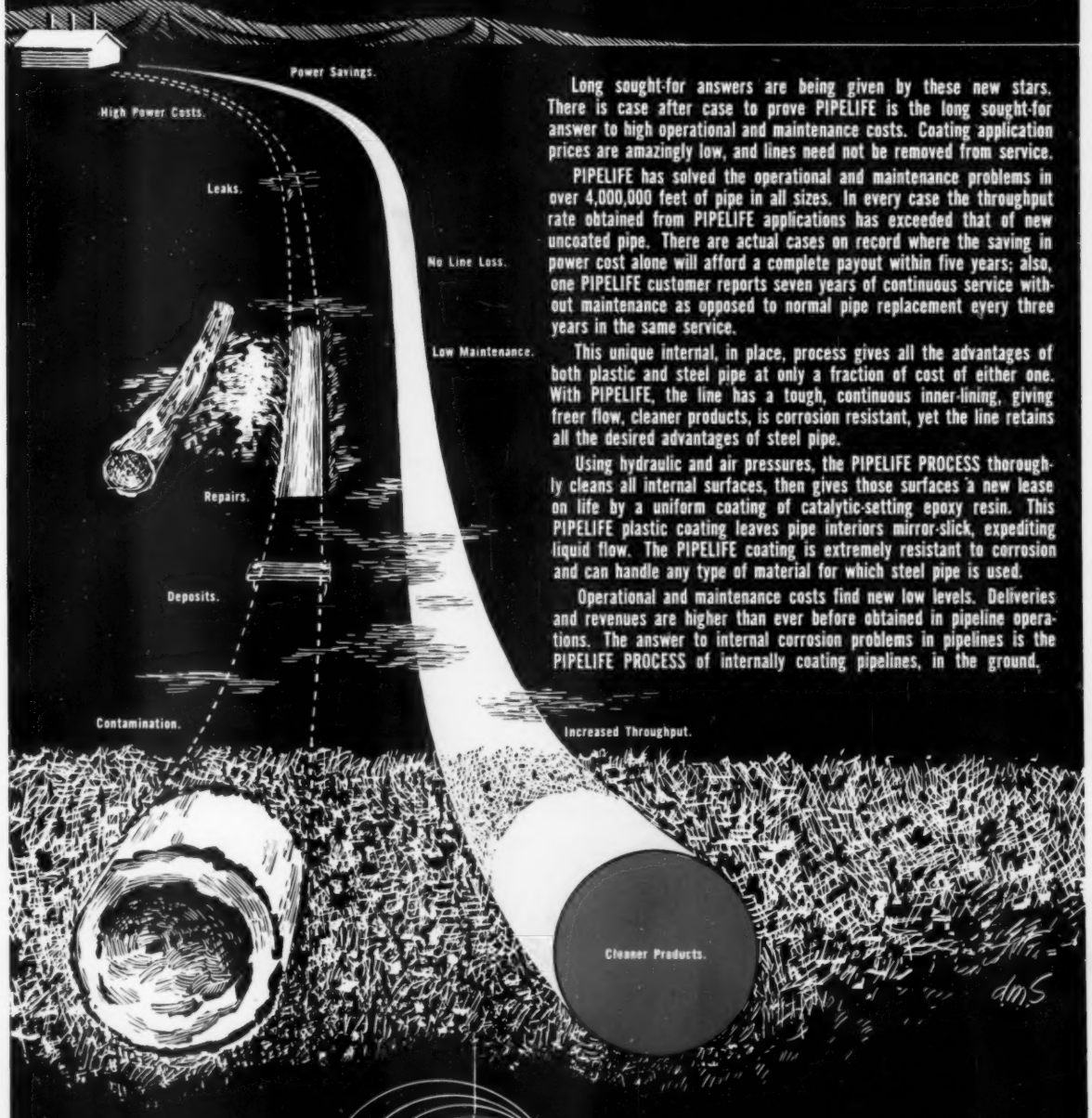
If the hole at the right in the above photo proves dry, directional drilling can take place in other holes. In such an atmosphere, corrosion is a constant problem, even though the Sinclair platform has a cathodic protection setup. Painting is carried on constantly. Rising high above the gulf waters and the double-decker platform is the 140-ft derrick (below left). On the upper deck of the platform—floored with 3-in. planks—are the drilling rig, two 30x30-ft galvanized buildings; seven drilling water storage tanks; pipe racks; a crane with an 80-ft boom; Schlumberger unit; mud-logging unit; dry chemicals; weight materials; and mud tanks. On the cellar deck, which has a bar-grating floor, are mud storage facilities; a Haliburton unit; two 75-kw, ac generators for living-quarter power; a water distillation unit, capable of purifying 300 gal. of salt water per hour; and three diesel fuel tanks, with a total capacity of 900 bbl. The operation's pulse is on the drilling floor (right), where crews work 'round the clock. Average daily footage is 130 to 140 ft.

Contact between platform, boats, helicopters, and land base is maintained by an effective communications system. Shown in radio room atop the upper deck is Lindel Buchanan, supervisor of the platform.

TWO STARS BEGIN TO SHINE

PIPELIFE PLASTICS

ATOMIC ENERGY



Long sought-for answers are being given by these new stars. There is case after case to prove PIPELIFE is the long sought-for answer to high operational and maintenance costs. Coating application prices are amazingly low, and lines need not be removed from service.

PIPELIFE has solved the operational and maintenance problems in over 4,000,000 feet of pipe in all sizes. In every case the throughput rate obtained from PIPELIFE applications has exceeded that of new uncoated pipe. There are actual cases on record where the saving in power cost alone will afford a complete payout within five years; also, one PIPELIFE customer reports seven years of continuous service without maintenance as opposed to normal pipe replacement every three years in the same service.

This unique internal, in place, process gives all the advantages of both plastic and steel pipe at only a fraction of cost of either one. With PIPELIFE, the line has a tough, continuous inner-lining, giving freer flow, cleaner products, is corrosion resistant, yet the line retains all the desired advantages of steel pipe.

Using hydraulic and air pressures, the PIPELIFE PROCESS thoroughly cleans all internal surfaces, then gives those surfaces a new lease on life by a uniform coating of catalytic-setting epoxy resin. This PIPELIFE plastic coating leaves pipe interiors mirror-slick, expediting liquid flow. The PIPELIFE coating is extremely resistant to corrosion and can handle any type of material for which steel pipe is used.

Operational and maintenance costs find new low levels. Deliveries and revenues are higher than ever before obtained in pipeline operations. The answer to internal corrosion problems in pipelines is the PIPELIFE PROCESS of internally coating pipelines, in the ground.

PIPELIFE

CORPORATION

3920 SO. PEORIA
TULSA, OKLAHOMA
PHONE RIverside 2-5544

The rapid transit system linking mainland and drilling platform is this helicopter. Here it is preparing to land on the 50x50-ft heliport atop one of the buildings. Two helicopters, operated by General Air Transport, service the platform—transporting passengers and small critical supplies.

By air . . .

. . . and by sea

Three boats, provided by Sea Service Inc., service the platform: two 82-ft crew boats and one 135-foot cargo boat. Here the cargo boat nestles alongside the platform while huge crane unloads hoppers of barium sulfate used in mixing drilling mud. One boat keeps constant vigil, standng by at all times in case of emergency.

Two men from the platform prepare to rope-swing aboard approaching crew boat, which brings groceries and light equipment and supplies out from shore and transports men to and from the drilling site. The boat is a welcome sight to crews who have put in their 10 days of duty and are heading for 5-day leave ashore.

Stop Corrosion
ON YOUR
DISTRIBUTION SYSTEMS

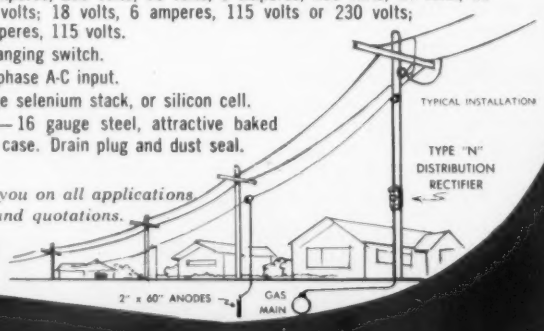
GOOD-ALL TYPE N DISTRIBUTION RECTIFIER

LOW COST — Less than one dollar per customer per year for complete protection. Small concentration of earth currents prevents interference on foreign piping. No heavy equipment needed for installation.

Good-All's experience as the first producer of *small, low cost* distribution rectifiers has been utilized in the development of the Type "N", the finest, most reliable protective unit in use today . . . often copied but never equalled. Sturdily built and precision engineered, it will give long, care-free cathodic protection. You will find that a network of Type "N" rectifiers provides essential corrosion "insurance" for well coated systems and is an absolute necessity for poorly coated distribution systems.

SPECIFICATIONS

D-C Output Ratings	36 volts, 10 amperes, 230 volts; 36 volts, 6 amperes, 230 volts; 24 volts, 10 amperes, 230 volts; 18 volts, 6 amperes, 115 volts or 230 volts; 18 volts, 3 amperes, 115 volts.
Adjustments	11-step tap changing switch.
Input	60 cps, single-phase A-C input.
Rectifier	Full-wave bridge selenium stack, or silicon cell.
Construction	Oil immersed — 16 gauge steel, attractive baked enamel finish case. Drain plug and dust seal.



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PLAN NO.	1	
PLOT	1	
LOTS	1	

R. P. Drybread
Northern Natural

James W. Penn
Northern Natural

John Potter
Texas Gas

C. E. Russell
J. B. Beaird Co.

James Williams
Kaiser

Ernest Donatic
Kaiser

JOHN POTTER has been named manager of community relations for Texas Gas Transmission Corp., Owensboro, Ky. Formerly supervisor of publications, Mr. Potter will coordinate the company's activities and press relations in the areas adjacent to its pipeline system. He will also continue as editor of the company magazine. Texas Gas Transmission has also promoted three members of its engineering staff. JAMES N. WHITE is now assistant superintendent of design engineering. He is succeeded as supervisor of compressor station construction by GERALD A. SUDDOTH, formerly senior engineer. JAMES O. KING, formerly senior engineer, has been promoted to senior staff engineer.

PAUL K. ECKHARDT is now manager of the general apparatus sales department of Union Switch & Signal, division of Westinghouse Air Brake Co., Swissvale, Pa. Mr. Eckhardt has held several supervisory positions with Union, the latest being section engineer, traffic engineering section.

Several appointments have been made in the engineering and construction division of Koppers Co. Inc., Pittsburgh. OWEN R. RICE, a divisional vice president who formerly was manager of the Freyn engineering department, is now a special consultant to Dr. W. C. Rueckel, vice president and general manager of the division. FRED W. RYS succeeds Mr. Rice as vice president and manager of the Freyn department. R. W. VOLLMER has been named to fill the newly created position of assistant to the general manager of the division, and J. S. ATWOOD has succeeded him as manager of the division's chemical department.

Three new sales representatives have been added to the staff of Frank Wheatley Supply Co., Tulsa. JERRE WADDOCK has joined the Tulsa staff, DAN SMARTT will work out of Oklahoma City, and I. W. MCKINNEY will cover the Houston area.

Trunkline Gas Co., Houston, has appointed RAYMOND E. FAIRCHILD as Houston district geologist. He was formerly with Pan American Production Co. New district geologist for the southern Louisiana district is CLARENCE EUGENE WHIPP, JR., who will headquarter in Lafayette, La.

C. E. RUSSELL has been promoted from works manager to vice president in charge of manufacturing at the J. B. Beaird Co. Inc., Shreveport. He will continue to direct the production of all manufacturing divisions. MARVIN M. MARTIN is now manager of the L.P. gas and NH_3 dealer storage tank sales, and JOHN L. SMITH has joined the division as sales representative in California and Nevada. He will headquarter in Stockton, Calif.

A. D. GREENE has retired as executive vice president of United Gas Pipe Line Co., Shreveport. Succeeding him is D. D. DILLINGHAM, a member of the company's board who has been serving as administrative assistant to company president Ed Parkes.

R. P. DRYBREAD and JAMES W. PENN have joined the gas reserves and availability section of Northern Natural Gas Co., Omaha. Mr. Drybread will serve as reserves engineer, and Mr. Penn as geological engineer.

ERNEST F. DONATIC is general superintendent and JAMES P. WILLIAMS is manager of engineering and planning at the Kaiser Steel plant at Fontana, Calif. REYNOLD C. MACDONALD is now division superintendent of rolling mills at Fontana, and GORDON A. ZWISSLER is assistant general superintendent in charge of services.

WILLIAM T. DURKIN is manager of the Pittsburgh office of Clark Bros. Co., Olean, N. Y. Prior to his present appointment, Mr. Durkin was manager of Clark's reciprocating engineering sales department in Olean, where he was in charge of all application engineering for Clark reciprocating compressors. His 15 years' experience in all phases of compressor application will be of great value to users of compressors in the Pittsburgh ter-

(*Continued on page* 148)

Jerre Waddock
Wheatley Supply

Dan Smartt
Wheatley Supply

I. W. McKinney
Wheatley Supply

William Durkin
Clark Bros.

fish
ENGINEERING CORPORATION
HOUSTON, TEXAS

LET FISH GO WITH YOU EVERY STEP OF THE WAY

The Fish Companies have played a vital role in some of the most important projects of the postwar era. Forethought and vision are apparent in every project. Fish economists, engineers and construction men lead the way—every step of the way.

Affiliated Companies

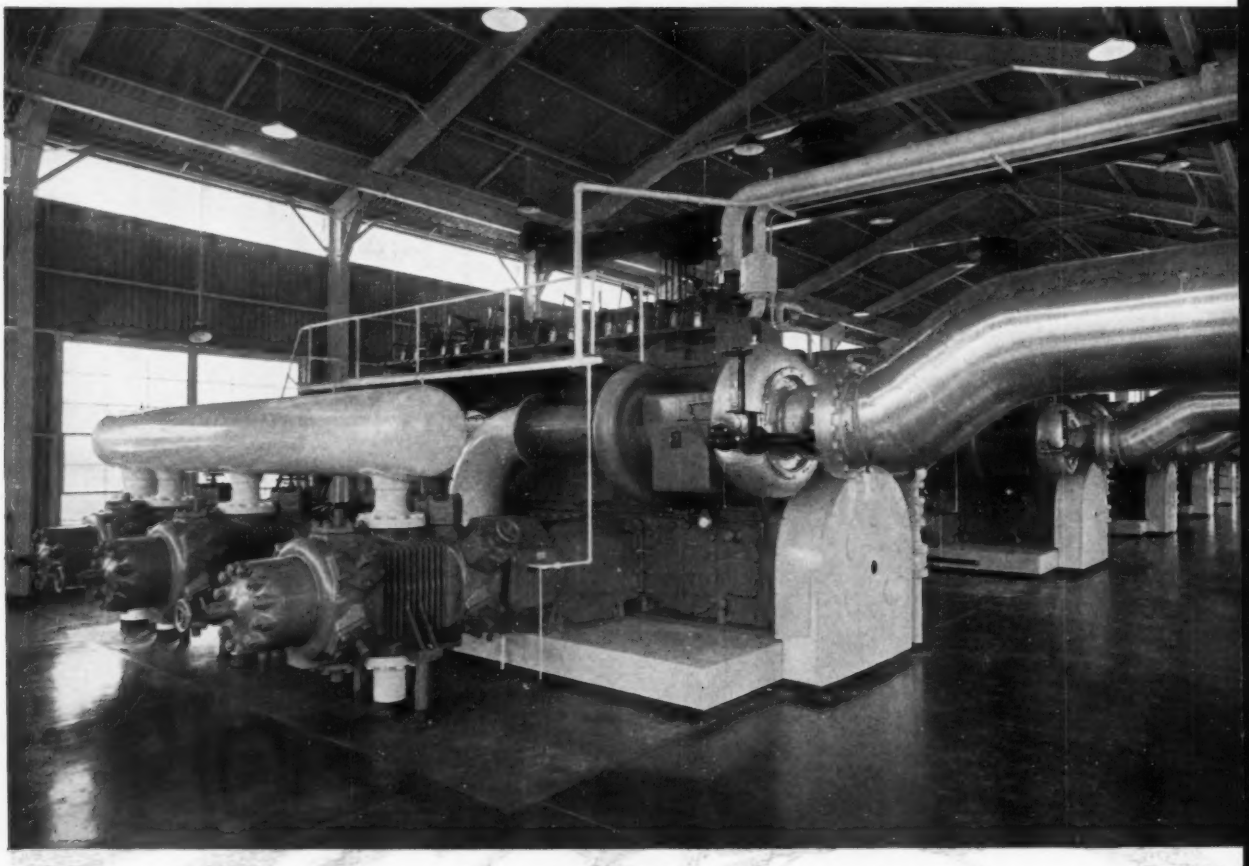
FISH SERVICE CORPORATION

FISH NORTHWEST CONSTRUCTORS, INC.

For Pacific Northwest's...

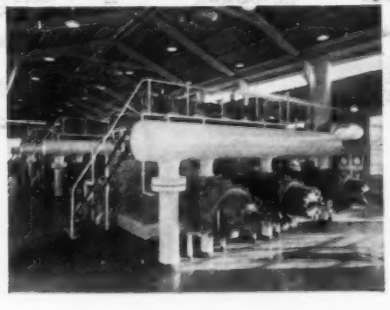
Altitude: 6600'

Station-1. Ignacio, Colorado
Six–2000 bhp. Clark TLA-6 Turbo-supercharged Compressors



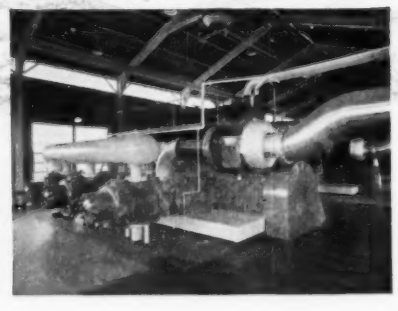
Altitude: 5620'

Station-2. Moab, Utah
Four–2000 bhp. Clark TLA-6 units



Altitude: 6000'

Station-4. Rangely, Colorado
Four–2000 bhp. Clark TLA-6 units



Mile high pipeline

46,000 BHP. of Clark Turbo-supercharged Compressors Furnish Over Half the Main Line Horsepower

Some of the most rugged terrain in the country is covered by Pacific Northwest's 1500 mile pipeline serving the northwestern part of the United States. Twenty-three Clark 2000 bhp. TLA-6 turbo-supercharged compressors supplied over half of the main line horsepower.

With stations operating at elevations of up to 6600', normally aspirated engines would have required heavy deration. The Clark TLA-6 units, however, operate with substantially less deration because they are turbo-supercharged. (Clark can now supply for its TLA units, as optional equipment, a special turbocharger for high altitude applications which permits sea level ratings. No deration is required.)

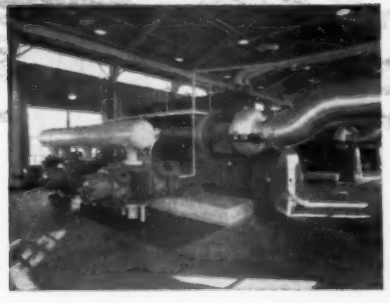
Mountain top locations or "down in the flats", the modern Clark turbo-supercharged compressor is the most economical prime mover to install on today's pipelines. They are built in seven sizes ranging from 1100 to 3400 bhp. Your nearest Clark representative will be pleased to give you complete information.

CLARK BROS. CO., OLEAN, NEW YORK
One of the Dresser Industries
Offices in Principal Cities Throughout the World

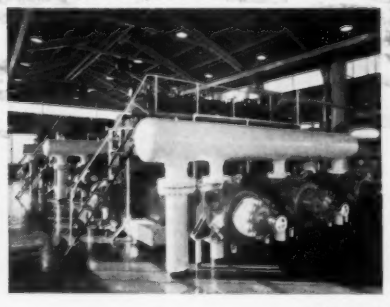
CLARK®

Turbo-supercharged Compressors

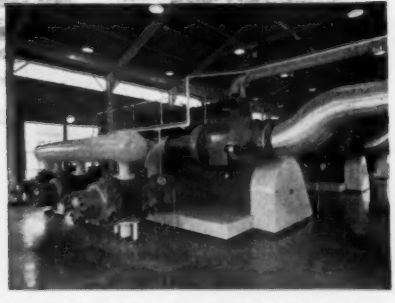
Altitude: 4400'
Station-8. Soda Springs, Idaho
Three–2000 bhp. Clark TLA-6 units



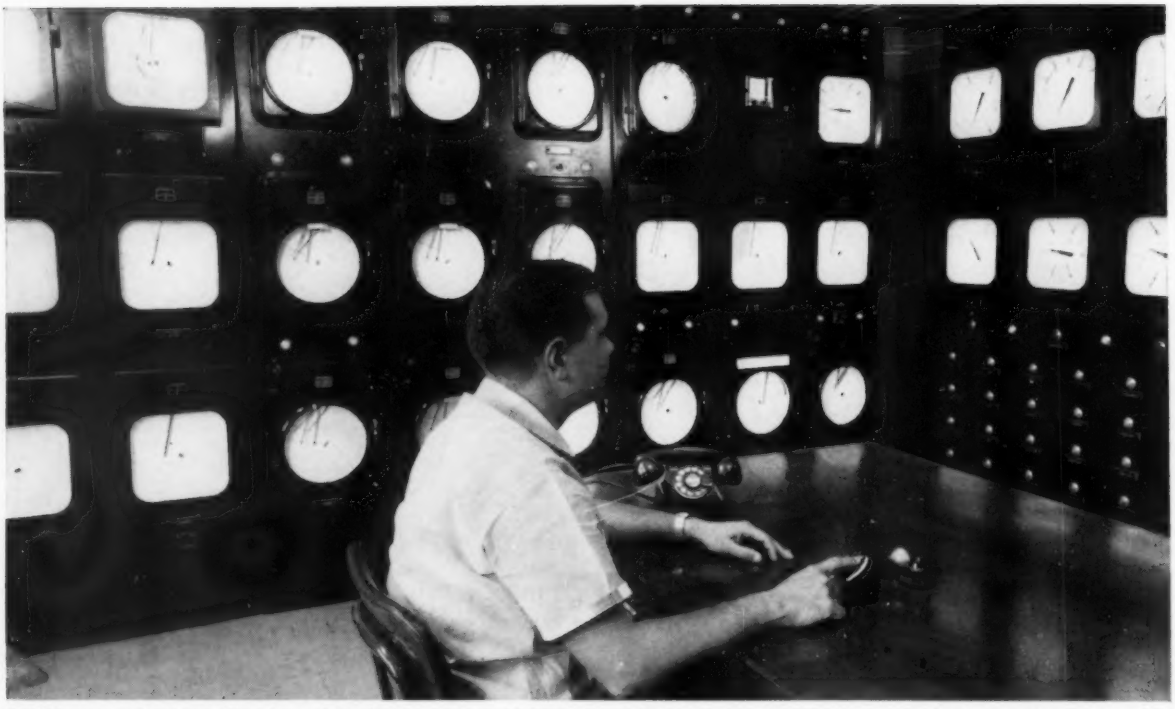
Altitude: 3000'
Station-9. American Falls, Idaho
Three–2000 bhp. Clark TLA-6 units



Altitude: 3000'
Station-10. Twin Forks, Idaho
Three–2000 bhp. Clark TLA-6 units



NOTE: All horsepower ratings are based on sea level elevation.



Bell System *selective calling* is used by the dispatcher of Mississippi Valley Gas Co. By flipping a switch, dialing the number of a distant metering point and reading a meter, he knows the pressure, flow and temperature at any of the company's 21 field points.

"When you're sure how much you have, you know how much you can sell"

J. H. Lambdin, Vice President—Operations, Mississippi Valley Gas Company

Bell System telemetering channels provide data on which Mississippi Valley Gas Co. can regulate flow to within 1% of a 60,000 MCF supplier contract limit. With this up-to-the-minute picture of the system, the company is better able to sell more gas.

This system, first of its kind in the country, was designed especially for Mississippi Valley. Used only to read remote meters now, it can be adapted to perform actual control functions at distant points.

• • •

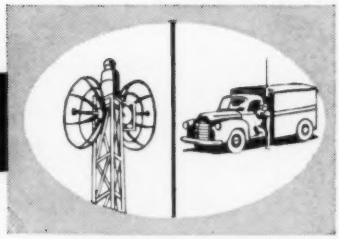
If you'd like to have faster, more efficient communications, call your Bell Telephone representative. He will be glad to study your needs.

BELL TELEPHONE SYSTEM

PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER

CHANNELS FOR: DATA TRANSMISSION • TELEMETERING • REMOTE CONTROL
TELEPHOTOGRAPH • CLOSED CIRCUIT TV

communications



By FRANK CHAPMAN

Walkie-Talkie finds many uses in gas operations

The World War II-born Walkie-Talkie radio transceiver is finding many varied uses in and around gas company operations. The flexibility of the unit, because of its size and mobility, makes it applicable in numerous operations where no other type of equipment could be used.

One worthwhile application is in the testing of automatic shutdown facilities at gas pipeline compressor stations. In instances of this kind it is necessary to establish only temporary communication between two or more points so that the operation of valves and other equipment can be coordinated. Since testing is done on a periodic schedule it would not be economical to install permanent communication equipment for this purpose alone. In addition, the mobility of the Walkie-Talkie makes it more adaptable to such a testing operation than fixed equipment.

On gas pipeline general maintenance, the Walkie-Talkie type transceiver is all but indispensable. It has become particularly valuable in the case of emergency repair operations. The portability of the unit permits it to be taken to the scene of an emergency repair which may be inaccessible to vehicle-mounted mobile radio equipment. Similar use of the equipment is found in the survey and construction of a pipeline.

Because of the low power and high frequency of most of the Walkie-Talkie units, the usable range is limited. However, this in itself serves as an advantage is not creating interference with other communication services. Also, the basic uses of the equipment involve communication over relatively short distances.

A still newer development in this field is the low frequency "Handie-Talkie." Among these is the Motorola radio paging unit which is designed specifically for intra-plant or office use. Whereas the conventional Walkie-Talkie operates at very high frequencies, the Motorola paging unit operates within a confined induction loop area.

As the gas industry acquires more experience with highly portable communication units of this kind, it can be expected that they will be used still more extensively, and possible for other purposes than voice communication.

Notice of appearance filed in microwave case

The Central Committee, among other organizations, has filed a notice of appearance in the microwave hearing, Docket 11866, scheduled by the Federal Communications Commission.

In its notice, the committee pointed out that the "continued use of the microwave frequencies by the petroleum and natural gas industries is absolutely essential if the American public is to continue to receive the ever-increasing quantity of petroleum and petroleum products which it is demanding and at costs which are within the means of every American citizen."

The committee went on to point out that the assignment of frequencies to give the petroleum industry use of microwave, without restriction, becomes of prime importance in normal times and mandatory in times of national or local emergency and thus is in the highest public interest.

In addition, the committee will strongly argue that "the public interest would be adversely affected by placing the communications facilities of this vital industry in the central control of any communications common carrier, and that it will further establish detailed reasons why the commission could not consider the availability of common carrier facilities as a condition of eligibility for private microwave systems" and show that the operation of private point-to-point systems, along routes where common carriers have systems, will not adversely affect the ability of the common carriers to serve the general public, but will, in fact, result in more services being available to the public along those routes already established by the common carriers.

Among other organizations filing notices of appearance in this docket are the Petroleum Industrial Electrical Association, the National Committee for Utilities Radio, the AGA, Columbia Gas System Service Corp.

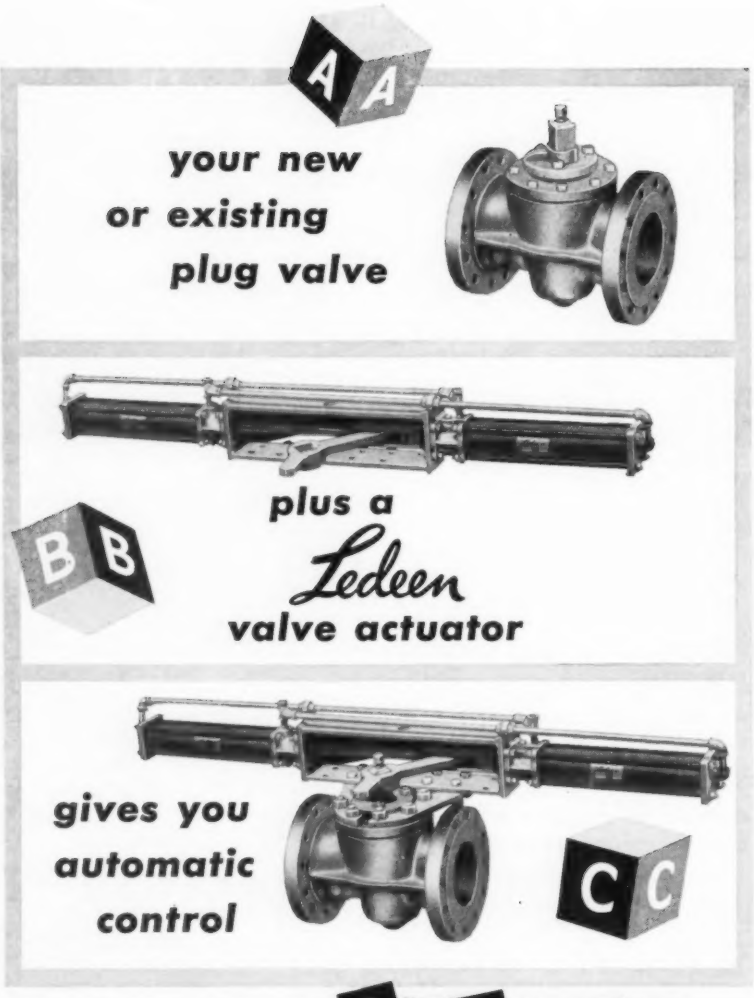
Lease and maintenance ruling issued

California's PUC has decided that Pacific Telephone & Telegraph Co. may continue leasing and maintaining private mobile radio systems in the state.

Nine mobile radio installation and service firms and the City of Los Angeles, in lengthy hearings before the commission, urged disapproval of PT&T's tariffs for the service, claiming that the business was not a utility service. PT&T's participation in the business, the installation firms claimed, constituted unfair competition with small businessmen, and that the filing of tariffs was an attempt to evade a consent decree between American Tel & Tel and the Department of Justice.

The January 1956 decree prohibits AT&T and its subsidiaries from "leasing and maintaining facilities for private communications systems, the charges for which are not subject to public regulation." Pacific was the first subsidiary to file a tariff rate for private mobile radio service since issuance of the consent decree.

Each customer desiring to make

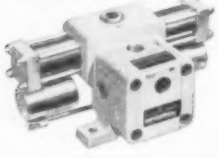


it's just that SIMPLE

You can convert all of your line valves for automatic control simply by equipping them with Ledeen Valve Actuators—easily and quickly done in the field without interruption of service or modification of plug valves.

Pneumatically or hydraulically operated, these valve actuators are adaptable to gate, diaphragm and plug valves for direct or remote control.

Ledeen Valve Actuators are available in a wide range of torque capacities.



Control your Ledeen Actuators with Ledeen Valves

Write for Bulletin 3020

VALVES • CYLINDERS
VALVE ACTUATORS
AIR-HYDRAULIC PUMPS
AND BOOSTERS

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3334 North Gilman Road
El Monte, California

communications • *Cont'd.*

use of PT&T's private mobile radio system will still have to obtain a license from the FCC, as do customers of competing systems. No such licenses are required for a separate "common carrier" mobile service also provided by Pacific. This was not at issue in the hearings.

In its decision, the commission said it was "not convinced" that PT&T's presence in the private mobile radio field will constitute any "threat to the continued vigor of its competitors." The PUC also held that the consent decree "is not actually pertinent to the issues in this case."

Motorola promotes Walter Byrne

Walter C. Byrne Jr. has been promoted to the position of sales manager in Motorola's microwave and industrial control department. He will be responsible for the nationwide direct sale of Motorola microwave, power line carrier, audio multiplexing, power transmission line carrier couplers, and industrial control equipment.

With the company since 1950, Mr. Byrne was first a senior engineer and then a specialist in microwave and industrial control products. Prior to his new assignment, he was midwestern district sales manager.

Recent FCC allocations

New York State Natural Gas Corp. for one base station at Brady township, Pa., on 48.70 mc.

Nevada Natural Gas Pipe Line Co. for one base station at Searchlight, Nev., on 48.62 mc.; one fixed relay station near Alunite, Nev., on 451.35 mc; one control unit at Las Vegas on 456.35 mc, and one fixed relay station at Searchlight on 456.35 mc.

Transcontinental Gas Pipe Line Corp. for two base stations at Baton Rouge, La., and Charlottesville, Va., on 48.74 mc.

Pacific Northwest Pipeline Corp. for two base stations at Rangely and Ignacio, Colo., on 48.86 mc.

Natural Gas Co. of West Virginia for one base station at Lisbon, Ohio, on 33.38 mc.

Oklahoma Natural Gas Co. for one base station at Stillwater, Okla., on 48.78 mc.

Now... Talk through noise

NEW TRANSISTORIZED POWER VOICE speaker

The secret is in the exclusive **"GOLDEN HEART"** *transistor*

Hear your mobile radio

HUNDREDS OF FEET AWAY

Now your vehicles, in fact any mobile radio equipped vehicle, can get far greater volume than ever before, with the new Motorola transistorized Power Voice Speaker.

This new compact, inexpensive speaker-amplifier combination delivers 10 TIMES MORE POWER than the conventional passive speaker. No more straining to hear messages. Just turn it up—it's got all the volume you'll *ever* need, all in this one small package. No longer is your driver shackled inside his vehicle...he can move about freely, hundreds of feet away, and still hear his dispatcher.

Secret of Motorola's newest development is the built-in transistorized amplifier, utilizing two long-life, Motorola power transistors. With the average 12 volt mobile radio system, the new speaker develops *15 watts* audio output. Even on a 6 volt system, you get 5 watts output—*much* more than the conventional one watt speaker level.

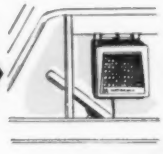
This power packed speaker is available for your mobile 2-way radio NOW. It can be quickly and easily added to most 6 or 12 volt installations. With the new Power Voice Speakers doing a bigger, better job for you, you'll also find low battery drain, bandpass response that accents voice frequencies, and versatile Quick-detach mounting...in a compact, all-metal housing.

You must *hear* the new Power Voice Speaker to appreciate what this added power can mean to you. Write, phone or wire today...or mail the coupon below.

New POWER VOICE speaker mounts firmly under dash in same familiar position

BUT...

detaches in a second to be hung from vehicle window and may be heard clearly hundreds of feet away.



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How BANTAM cuts costs on pipeline jobs

This BANTAM with 25-in. hoe bucket dug 1 mile of 6-ft. trench in only 16½ working days while loading all material into trucks.
HANUS

Around Menominee Falls, Wis., Ken Hanus and his carrier mounted BANTAM thrive on jobs like this. Sometimes it's steady digging. Again, it's taking over assignments the trenchers can't handle, such as digging to depths of 14 ft., V-topping trenches to prevent cave-ins or working around service lines. But whichever it is, BANTAM saves time and eliminates costly work stoppages and hand trim.

Note, above, how BANTAM's low center of gravity permits working at difficult angles on ditch slopes. Better balance and smooth performance keep production at top speeds.

Ken Hanus switched to BANTAM 6 years ago. He's high on BANTAM mobility that lets him travel up to 25 miles a day to the job. About maintenance he says, "Owners should have no maintenance whatsoever during the first year and in the ensuing years it will not average over $50 to $100 with normal care."

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Company.....

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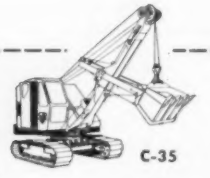
C-35

CR-35

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people • *Continued*

from page 140

ritory, which is composed of parts of Kentucky, Maryland, New York, Ohio, Pennsylvania, Virginia, West Virginia, and the provinces of Ontario and Quebec in Canada. He will headquarter at No. 2 Gateway Center, Pittsburgh.

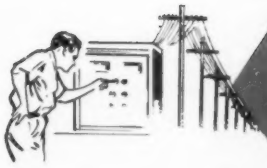
Two promotions to key positions have been made in the Winnie (Texas) plant of Texas Gas Corp. R. T. NEVILLE, formerly superintendent of the plant, is now general superintendent in complete charge of all plant operations. CHARLES C. ALBRITTON, formerly superintendent of operations at Winnie, has been promoted to assistant general superintendent.

Managers for eight service regions have been named by the technical products service department, RCA Service Co. Inc., Camden, N. J. They are: R. D. BACHIN, eastern region, New York; M. E. WHEATON, mideast region, Philadelphia; C. L. SWINNEY, southeast, Atlanta; W. W. GILREATH, southwest, Dallas; E. D. VAN DUYNE, west central, Kansas City; F. W. HAMRE, central, Chicago; H. M. MADISON, western, Hollywood, Calif.; and H. E. FRISBIE, east central, Cleveland.

H. C. Price Co., Bartlesville, Okla., has appointed ROBERT P. WHITE vice president in charge of the firm's pipe coating division. Mr. White, who has been manager of the division since 1951, succeeds J. STEWART DEWAR, who has retired.

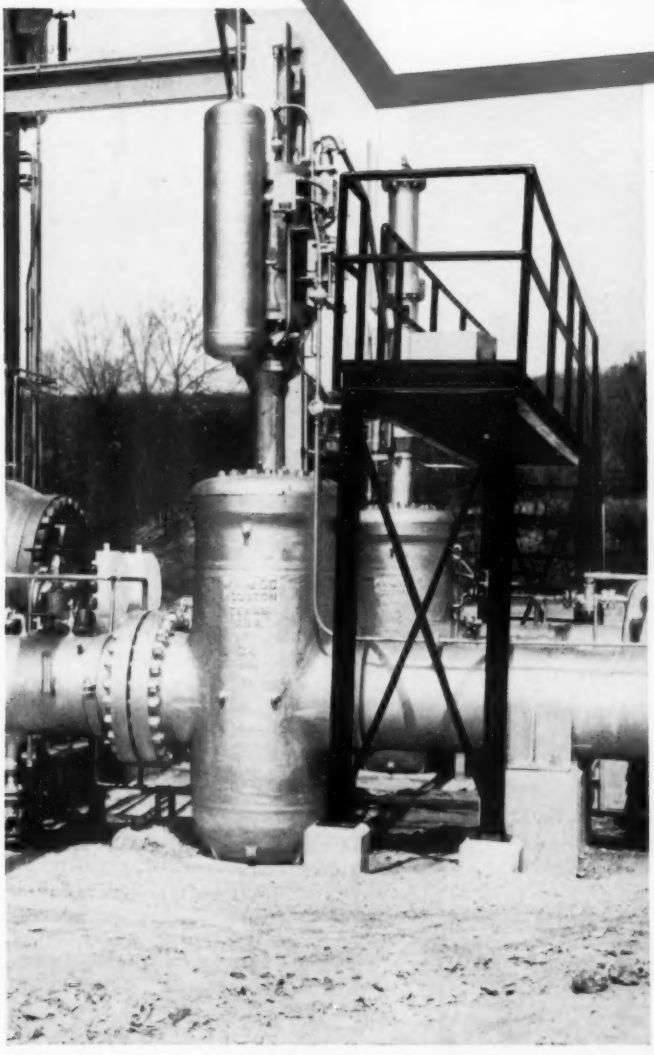
Several new officers have been elected by Texas Gas Corp., Houston. A. CARL GLADDEN, vice president and treasurer, is a new member of the board of directors. Newly elected vice presidents are A. A. WHITE, secretary and general counsel, and DR. WILLARD M. DOW, director of research. Dr. Dow is now in charge of manufacturing, engineering and research. EARL ELLIOTT of the legal department has been elected assistant secretary.

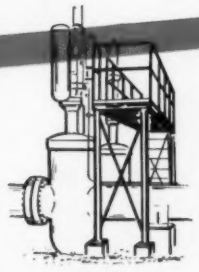
Three additions have been made to the staff of corrosion engineers at Cathodic Protection Service, Houston. TED L. CANFIELD, formerly head of the corrosion engineering department for Consolidated Gas Utilities Corp., will work out of the Tulsa office. RALPH B. PASS, assigned to New Orleans, was



W-K-M *Dependability...*

VITAL IN GULF INTERSTATE'S FULLY AUTOMATIC COMPRESSOR STATION





Completely dependable valve operation is of the utmost importance in this remotely controlled, fully automatic compressor station. These valves, operated from a station 80 miles distant, must open or close at the push of a button. The parallel expanding gate in W-K-M valves is the best possible insurance for dependable operation. Before moving into open or closed position, the gate segments are positively contracted by the exclusive LEVERLOCK and held in this position, assuring free and easy movement of the gate. Expansion of the gate segments against both upstream and downstream seats provides a positive double seal. Their Through-Conduit provides full volume, free flow . . . offers no more pressure drop than an equivalent length of pipe . . . sets up no turbulence. The right ratio of port opening to closing speed prevents dangerous line surges.

For the ultimate in dependable performance with minimum maintenance all along the line, specify W-K-M Pipeline Valves. Write today for your copy of the new W-K-M Pipeline Valve Catalog 300.

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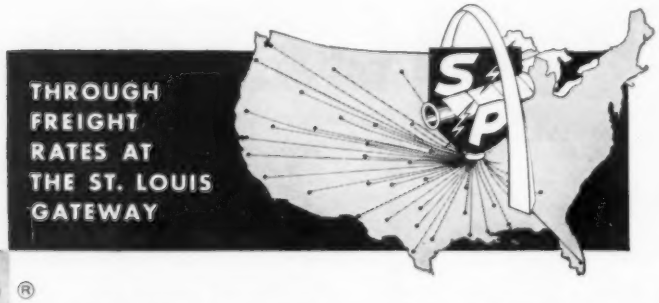
As your pipe moves through our plant, your instructions are explicitly followed, for SPI believes that there is no substitute for customer satisfaction.



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people • *Continued*

with Southern Natural Gas Co. for several years. The third addition, LESLIE L. DICKSON, specialized in the field of cathodic protection at Public Service Co. of Colorado for the past six years. He will work out of the Houston office.

Ted Canfield
CPS

Leslie Dickson
CPS

Harry Johnson Jr.
BS&B

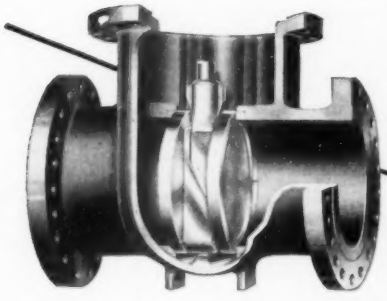
Ralph Pass
CPS

HARRY LEE JOHNSON JR. has been promoted to the newly created position of technical service, lease automation by Black, Sivalls & Bryson Inc. The new post has been created to provide added facilities for broadening industry consultation on lease automation.

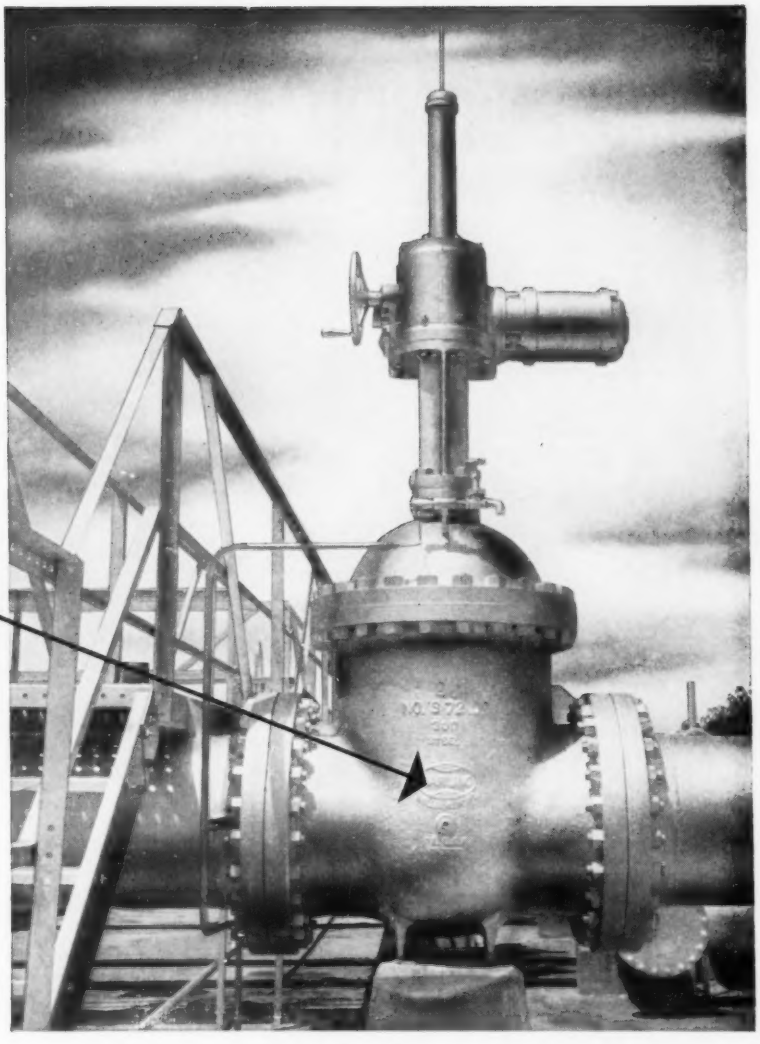
E. WESTON HAMMOND has been appointed district manager, Los Angeles office, for Worthington Corp. He succeeds JOSEPH G. MURPHY, who has been named special representative for the Los Angeles district office.

Four organizational changes in the Gas & Coke division of Koppers Co. Inc., Kearny, N. J., have been announced. JAMES M. SPEES, superintendent of the Kearny plant since 1948, is now assistant manager of the division's Minnesota plant in St. Paul. Replacing him at Kearny is W. P. DITTMAR and succeeding Mr. Dittmar as assistant superintendent is A. H. PETERSON, who was production manager. H. J. MEREDITH, divisional development manager, will now assume the added duties of division production manager.

LOOK INSIDE



for dollars to be saved!



Darling 24", Series 300, motor-operated gate valve, with fully revolving double disc feature, at pipe line terminal of oil pumping station.

SURE! Other things being equal, it's definitely the inside of a gate valve that really tells the story. That's why we show and stress the importance to you of Darling's *fully revolving double disc, parallel seat principle!*

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That's why oil and gas men everywhere have come to count on Darling gate valves for surer performance, longer life and less down time. It pays. We'll gladly give you *all* the facts on Darling valves for your particular operations. Just ask.

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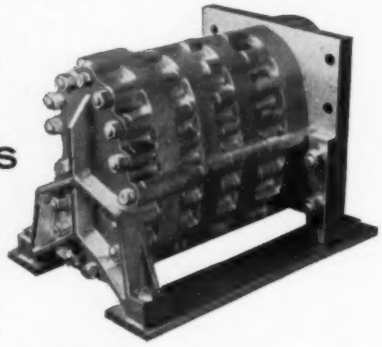

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PITTSBURGH 22, PA.

GAS pipeline news

FPC withholds action on Gulf's contract

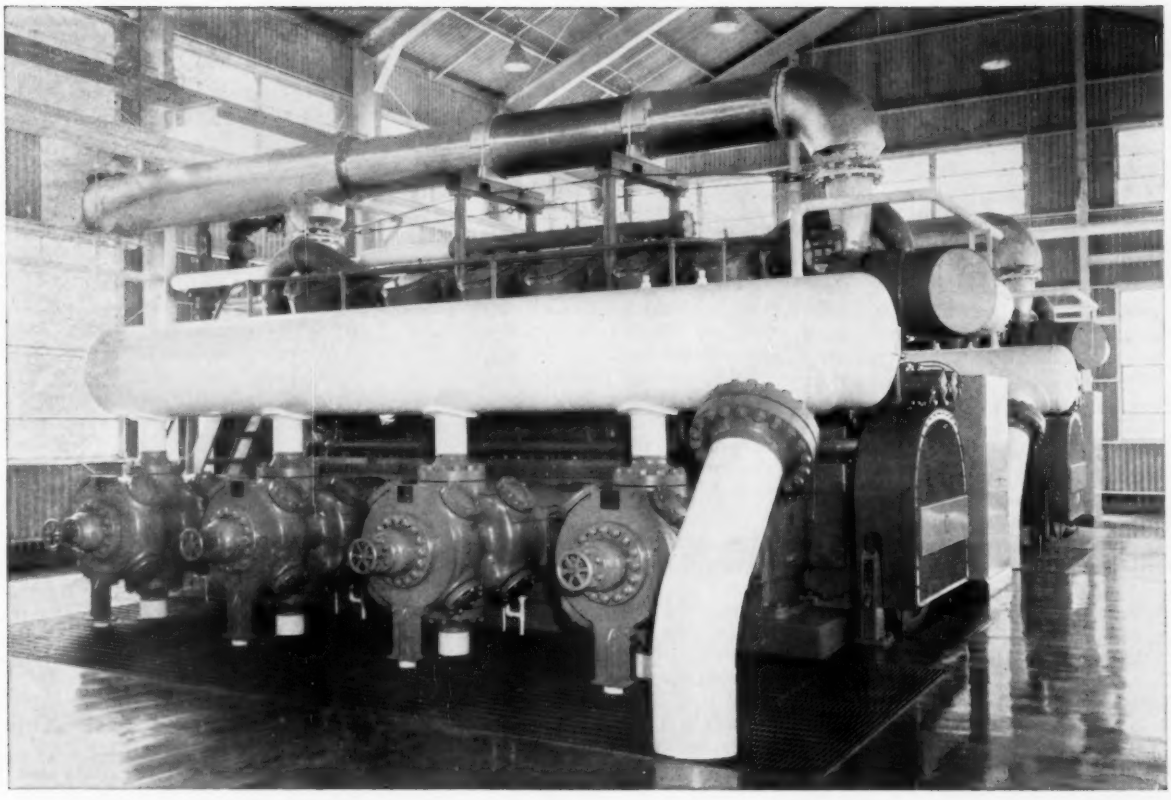
Action on the request of Gulf Refining Co. to withdraw its application for the sale of Krotz Springs, La. gas to American Louisiana Pipe Line Co. has been withheld by the FPC.

At the same time, the FPC permitted Gulf to withdraw three other applications proposing sales to American Louisiana from the Church Point, Hayes, and Washington fields in Louisiana.

All of Gulf's applications were filed last May and later were consolidated for hearings with American Louisiana's proposal to expand its system in the Midwest and a request by Panhandle Eastern Pipe Line Co. to abandon the sale of gas to a Michigan utility.

Hearings commenced in the consolidated proceedings on Nov. 14, and the following day Gulf said it had terminated four contracts. On Nov. 16, Gulf filed with the FPC a formal notice of withdrawal of the four applications. The hearings were then recessed subject to further order of the commission, and American Louisiana subsequently filed an answer to Gulf's withdrawal notice, claiming that the Krotz Springs field contract was still in effect, although the company didn't make such a claim regarding the other fields.

In its ruling on the notice of withdrawal by Gulf, the FPC said it was "fully cognizant of the fact that it is not within our province to determine the legal issues presented in the private controversy between American Louisiana and Gulf as to the continued vitality of the gas supply here involved." Postponement of action on the Krotz Springs contract, the commission said, "does not reflect any intention on our part to pass upon the merits of the private controversy, or to alter the rights of either part of the controversy," but on the con-



At Shelbyville, Indiana

American Louisiana installs 10,000 hp of KVS turbocharged gas-engine compressors

At Shelbyville, Indiana, in one of the three primary stations of American Louisiana Pipe Line Company, the efficiency of Ingersoll-Rand compressors and the flexibility of 4-cycle power are being applied to the task of supplying gas to utilities in Michigan, Wisconsin, Iowa and Missouri.

All of the five gas compressors at the Shelbyville station are 2000-hp Ingersoll-Rand KVS turbocharged gas-engine units. These are basically the same machines which have been setting new records since the first KVS was installed early in 1952, but incorporating the improvements which have resulted from years of tough service.

Incidentally, the first KVS (and the world's first turbocharged engine-compressor) was installed for an American Louisiana affiliate. With the forthcoming installation of six units at its new Defiance (Ohio) station, American Louisiana and affiliates will be operating 23 KVS compressors totalling 44,000 hp.

In addition to heavy-duty compressors, Ingersoll-Rand equipment for pipeline services includes rugged 4-cycle V-angle engine-generating units, centrifugal pumps, starting-air compressors, air and electric Impactools, and many other products. Ask your I-R representative how I-R can help you on your job.

Only Compressors have CHANNEL VALVES

Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which cushion action.

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COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS

trary "it is our purpose not to do so. We fully recognize that we cannot require a natural gas company to seek or accept a certificate of public convenience and necessity. Nevertheless, Gulf has not shown that it would be prejudiced in any way if its application were to remain on file."

Commissioners Digby and Connole dissented from the majority action insofar as it postponed action on withdrawal of the disputed contract. They declared that the Natural Gas Act extends no discretion to the commission to deny permission for withdrawal of an application "when, as here, the sale for which application is made has not been begun and is not otherwise under the commission's protection."

The dissenters asserted that it would be impossible "to deny permission to Gulf without making a conclusion of law on a matter of contract, the making of which has not been and indeed constitutionally could not be delegated to this commission." They said the FPC "cannot compel Gulf to proceed with the application, to continue its relations with American Louisiana, or in any other way to further the purposes for which the application was filed."

"Gulf has a right to obtain permission from this commission to withdraw its application under the circumstances and we see no need to postpone saying so," they said. Postponing action is tantamount to denying Gulf its right to obtain FPC permission to withdraw its application, they asserted, at least during the period in which action is withheld.

"Moreover," they added, "to deny it until the conclusion of some indefinite action in a court of law prejudices the outcome of any such action by casting doubt on the validity of Gulf's claim."

If in an appropriate forum of law, it should be proved that the contract will not permit cancellation, but in fact still binds the parties and governs their actions, under one of the terms of the contract Gulf is bound to file for and prosecute a certificate application the two dissenters said, adding that, accordingly, there is no danger of Gulf's not refiling and thereby depriving American Louisiana of this supply of gas.

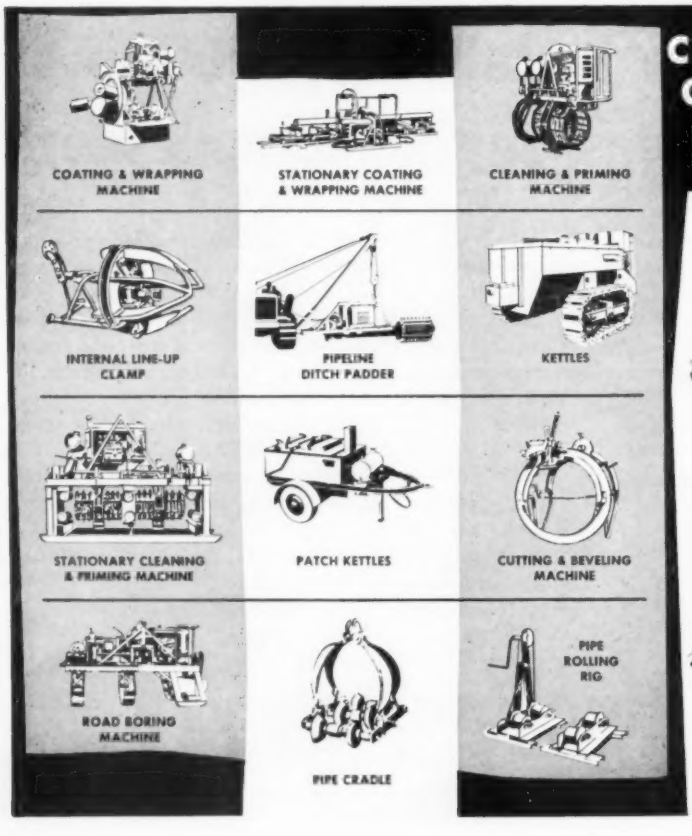
Transco's '57 expansion adds 215 MMcf/day

A construction program estimated to cost about $110 million is planned by Transcontinental Gas Pipe Line Corp. for 1957, Tom P. Walker, president of the company, told the Dallas Association of Investment Analysts recently.

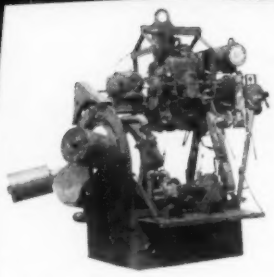
This year's expansion will add 215 MMcf of daily capacity to the pipeline, bringing the total up to 970 MMcf, exclusive of storage gas.

Although financing plans for 1957 have not been perfected, Transco expects to sell first mortgage bonds and debentures as well as additional stock, either common or preferred, depending on the market later in the year, according to Mr. Walker. In the meantime, bank credit will be used to finance construction as required.

Last year Transco added approximately a quarter of a trillion ft of new gas to its contracted supply, and at the end of the year total gas reserves under acreage dedicated to the company were estimated at 5.6 trillion cu ft. With respect to gas supply, Mr. Walker said the company's policy has been to acquire gas as it has been able



CROSE SPRAY-RING TYPE COATING & WRAPPING MACHINE



The spray-ring applicator makes this Crose machine the finest on the line . . . and more contractors use them!

The Crose machine assures uniform coating . . . precision wrapping . . . it coats Bends or "Egged" Pipe.

Available in sizes that handle pipe 2" to 36".

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Three efficient seals prevent shank leakage on OIC plug valves. Concentric grooves machined into the gland liner form a "labyrinth" seal. The liner also retains an O-ring in contact with the plug's top face for a second positive seal. And resilient packing between gland and gland liner forms the third seal.

But the maintenance man measures design by *results*. OIC plug valves get his O. K. because they stay in adjustment a long time without leakage. However, if *you* are interested in the exclusive gland design and construction of these OIC plug valves, write for specification literature.

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FORGED & CAST STEEL, LUBRICATED
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to find it at reasonable prices, and in sufficient quantities to keep up with the company's expansion.

"We believe that when the regulation problem is solved," he said, "producers will again be willing to offer their uncommitted reserves for sale to pipelines and that they can be acquired in a more orderly and satisfactory manner. The President's call for such a bill in his budget message and the efforts of the various segments of the gas industry to get together on satisfactory regulation, we think, will bear fruit. For Congress to spell out for the Federal Power Commission more definite rules by which it can discharge its responsibilities under the Phillips decision is the most important factor in our business at the moment. New gas is being discovered every day, and with present prices, the incentive to find additional reserves is strong. Whenever producers know under what rules gas can be sold, then these new quantities will be made available to the public."

Mr. Walker revealed that a subsidiary, Transcontinental Production Co., is spending about $2 million in the Pocono-Catskill regions of New York and Pennsylvania to locate "backyard" storage, which will enable it to provide additional gas for customers' peak requirements during excessively cold weather. Present storage in the Oakford, Pa., field provides capacity of 12 billion cu ft each year, with a maximum daily delivery of 136 MMcf during the period from Nov. 15 to April 15.

Although final figures for 1956 operations are not yet available, Mr. Walker estimated that Transco's gross revenues would be about $88 million, an increase of 18 per cent, and that earnings per share on common stock would be about $1.30, an increase of about 20 per cent over the previous year.

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For any pipe size
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Many sizes of ORIFICE FLANGE UNIONS, ORIFICE PLATES and FLOW STRAIGHTENING VANES are regularly stocked, available for immediate delivery

*Moorlane Metering Equipment is constructed in accordance with the recommendations of the AMERICAN GAS ASSOCIATION Gas Measurement Committee Report No. 3, and/or your specifications.

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Ohio Fuel Gas Co. plans 10th storage field

Ohio Fuel Gas Co., Columbus, plans to build its 10th natural gas storage area, to be known as the McArthur storage field.

The company has applied to the FPC for permission to activate and develop a new field in Vinton county, Ohio, including the installation of 15.1 miles of various diameter pipeline and a 3300-hp compressor station. Initial input capacity of 10 MMcf/day would be increased to 85 MMcf daily in 1958. Output capacity would be 40 MMcf and 70 MMcf for the peak days of 1959 and 1960 respectively. The cost of this portion of the project is estimated at $2,070,000, less net salvage of $19,200.

Other facilities for which Ohio Fuel seeks authorization (Docket G-11095) include the installation of superchargers and new compressors on units at the Wellington storage compressor station in Medina county, Ohio, increasing the station's rating from 3200 to 4320 hp and the input rate from 40 MMcf/day to 54 MMcf. The output rate is 190 MMcf/day. The estimated cost of these facilities is about $193,000, less a net salvage of $25,460.

Ohio Fuel proposes to activate and develop two additional storage pools in the Holmes storage field in Holmes, Wayne, and Ashland counties, including the installation of about 16 miles of line. Maximum deliverability of the two pools would be 35 MMcf daily.

The company asked permission to abandon existing compressors

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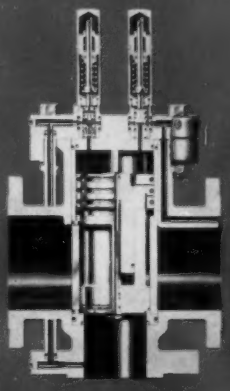
First of all, bubble-tight closure means complete freedom from annoying weep and simmer. Whether your Garrett Valves are on gas or liquid lines, whether they exhaust to atmosphere or against back pressure, an absolute, positive seal is maintained right up to the set pressure.

Even more important, bubble-tight closure ends the problem of wire-drawing and cutting at the seat and disk. In conjunction with the snap action of the main piston . . . quick movement to full open position, quick yet cushioned return movement to the seat . . . this feature practically ends seat and disk replacement, adds months and even years of trouble-free service, cuts maintenance expense to the irreducible minimum.

Bubble-tight closure is one of the many reasons so many major transmission and distribution companies have standardized on Garrett Relief Valves throughout their systems. For the full story, ask your Garrett representative, or write for Catalog No. 556 RV.



Garrett Type "D" Relief Valve. Sizes, 1" through 8", single or dual outlets, for working pressures from 150 to 5000 psi. Supplied with soft or hard seats, screwed or flanged connections.

Garrett Type "E" Relief Valve. Sizes, 1" through 8", for working pressures from 25 to 200 psi. Soft or hard seats, screwed or flanged connections.

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and piping at the Wellington station and 33 miles of line to be replaced by line proposed for the Holmes and McArthur projects.

Lateral line okayed for Texas Eastern

Texas Eastern Transmission Corp., Shreveport, has been authorized to build a lateral line in Harris county, Texas which will enable the company to take gas produced from the Alco-Mag and Aldine fields in that area (Docket G-9811).

Texas Eastern will build 17 miles of 8-in. and 3 miles of 6-in. from a point of interconnection with its existing 20-in. Baytown-Hankamer line to the field. Cost is estimated at $857,000.

Industrial Gas Supply Corp., Houston, which purchases gas in this sale area, was permitted to intervene in the proceedings and sought to have TET's gas purchase price established. Texas Eastern's contract calls for a price of 13.1 cents per Mcf, subject to adjustments based on Texas Eastern's cost of constructing the lateral and the volumes of gas reserves which will be transported. On this basis, the FPC found that the net wellhead price is 10.7 cents per Mcf.

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John Mason assumes new post with FPC

John C. Mason, one of four FPC assistant general counsels, has been named to the newly created post of deputy general counsel of the commission.

In his new position, Mr. Mason will assist the general counsel in administering the functions of the office, and will assume the responsibilities of the general counsel during any absences of that official.

Mr. Mason, who is 44, has been a member of the FPC's staff since 1934 and has served as an attorney on its legal staff since 1941.

Arkansas Louisiana cuts construction plan

Arkansas Louisiana Gas Co., Shreveport, has been authorized to delete $3.5 million of natural gas facilities previously okayed by the Federal Power Commission (Docket G-2307).

The deletion was requested by Arkansas Louisiana, which said its pipeline system requirements have not developed as rapidly as anticipated.

The project — authorized in July 1954 — included about 136 miles of line and a 10,500-hp compressor station at an estimated cost of $10 million. Four 24-in. loops totaling 52.8 miles will be eliminated.

Supreme Court upholds FPC's zone rate system

Federal Power Commission authority over transmission companies and independent producers was further strengthened recently by action of the Supreme Court.

The high court upheld the commission's right to set up a zone rate system and turned down nine appeals filed by independent producers challenging the FPC's right to regulate their activities.

The zone rate case goes back to 1955 when the FPC ruled that Northern Natural Gas Co.'s system-wide uniform rates were "unduly arbitrary and preferential." The commission told Northern to set up zone rates — the first it had ever ordered — which would have the effect of requiring higher rates

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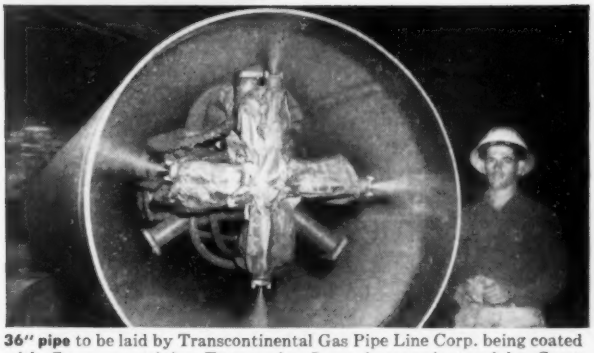
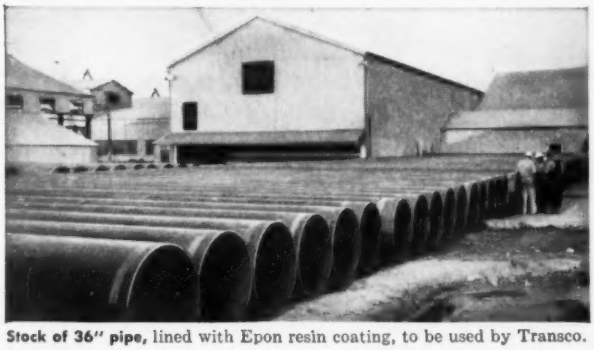


36" pipe to be laid by Transcontinental Gas Pipe Line Corp. being coated with *Copon*, containing Epon resin. *Copon* is manufactured by Coast Paint and Lacquer Co., Houston.



Stock of 36" pipe, lined with Epon resin coating, to be used by Transco.

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INTERNAL CORROSION of gas pipe lines has long been a costly maintenance problem. The solution is an Epon resin coating that stands up to corrosives, that does not flake or peel off, that can be readily applied.

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for gas users farthest from Northern's gas fields and lower rates for users near the gas fields. An appeals court upheld the FPC and the Supreme Court refused to review that decision.

FPC reports on 1955 sales of producers to pipelines

More than 5.5 trillion cu ft of gas was bought directly from independent producers by interstate pipeline companies during 1955, the FPC reports, at a cost of $586.6 million.

The figures, taken from reports filed with the FPC by interstate companies which are subject to its jurisdiction, indicate that the purchases—which totaled 5,513,299,774,000 cu ft—were made from 5032 natural gas producers. Nine of the producers, alone or as the first named party in combination with others, supplied more than one third of the total amount. Seventy-two, or 1.6 per cent, of the producers—alone or as first named —supplied 79 per cent of the gas.

The report says that the purchases were made in 19 states, with Texas leading with 52.4 per cent of the total and Louisiana second with 22.6 per cent. Producers in the four west south central states (Arkansas, Louisiana, Oklahoma, and Texas) supplied 80.6 per cent of the total.

For gas purchased in Texas, producers were paid $287.5 million, and for Louisiana purchases, $139.6 million. The average price per Mcf was 9.9 cents in Texas and 11.2 cents in Louisiana. The highest average price paid to producers, 32.3 cents, was in New York, and the lowest, 6.6 cents, in Montana. However, sales in those two states accounted for less than 0.05 per cent of the total.

West Virginia, with only 1.3 per cent of total sales, had the greatest number of producers, 1458, followed by Texas with 1044.

The purchases reported to the FPC by the transmission companies account for approximately 72 per cent of the net marketed production of natural gas in 1955.

TGT seeking 6.6 per cent return with rate increase

About 70 customers in 13 states would be affected by a $24.3 million rate hike Tennessee Gas Transmission Co., Houston, is seeking with the FPC.

The 12.2 per cent increase would be in addition to one for $8.6 million now in effect subject to refund.

TGT said that the proposed increase is based principally on increases in salaries, wages, taxes, purchased gas costs, cost of capital, and depreciation expenses. The company is seeking a 6.6 per cent rate of return in lieu of the 6 per cent under its presently effective rates.

Three of Tennessee's wholesale customers have filed rate increase applications primarily to pass TGT's increase on to their own customers, and other wholesale customers have indicated they are preparing to submit similar applications.

Additional financing arranged by Westcoast

Westcoast Transmission Co. has completed arrangements for an additional $18.2 million financing which will be used in construction of the $15 million gas scrubbing

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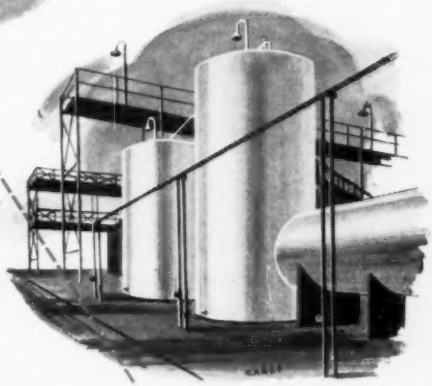

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pipeline news • *Cont'd.*

plant at Taylor Flats, B. C., additional gathering systems and increased contingencies.

This will bring total financing in connection with the 650-mile, 30-in. line to bring gas to the U. S. to $170 million to date. Seventy per cent of the line is now completed.

PG&E to seek PUC permits to serve three new towns

Pacific Gas & Electric Co. plans to ask the California Public Utilities Commission for authority to extend natural gas service to Williams, Arbuckle and Dunnigan.

According to F. Y. Kraft, PG&E's Colgate division manager, the three communities will be served from the company's Beehive Bend-Sacramento transmission line now under construction.

For distribution in Williams, PG&E proposes to build 1.5 miles of 4-in. main, 5 miles of 3-in. main, and 5 miles of 2-in. main. At Arbuckle, which is closer to the route of the 20-incher, one-quarter mile of 4-in., 1 mile of 3-in., and 4½ miles of 2-in. main will be required. At Dunnigan, the distribution system calls for about 1 mile of 1¼-in. and 2-in. main.

A franchise has to be obtained from Willliams; PG&E already holds franchises to supply natural gas service in the unincorporated areas of Colusa and Yolo counties.

Mr. Kraft estimates that construction in the three communities would be completed in time for service during the 1957-58 winter season.

Houston Texas and Coastal file compliance notice

Extension of natural gas service to Florida appears pretty certain now.

Houston Texas Gas & Oil Corp. and Coastal Transmission Corp., seeking permission to build pipeline facilities to Florida, have met all but two of the conditions laid down by FPC in an earlier tentative approval (GAS, February, p. 128).

Although backers of the plan weren't happy about it, they have filed an amended petition in which two Florida electric utilities agree to remove cancellation and reduction-in-take provisions of transportation contracts with Houston-Coastal.

In addition, escape clauses in producer contracts for transportation gas have been removed.

To meet FPC demands of cost allocation, the producers have taken a 2-cent cut in the price of transportation gas and the electric firms have agreed to a 2-cent increase in the transportation charge by the pipeline. This will mean that Florida Power & Light will pay 17.5 cents per Mcf and Florida Power Co. 13.5 cents, and Houston-Coastal revenue will go up by $1,095,000 a year.

Provisions in the contracts tying the cost of gas to the cost of oil will remain in the contract.

Houston-Coastal has asked for the commission to reconsider its condition that cancellation provisions be removed from direct primary interruptible contracts, contending that this is not within the jurisdiction of the FPC. The firms also request that a provision of the conditional authorization by FPC requiring minimum monthly bills, instead of minimum yearly bills as now provided in the contracts be dropped.

Backers of the project believe that these last two "minor" conditions laid down by the FPC can be worked out, and that certificates will be issued soon.

New Texas Gas facilities given final okay by FPC

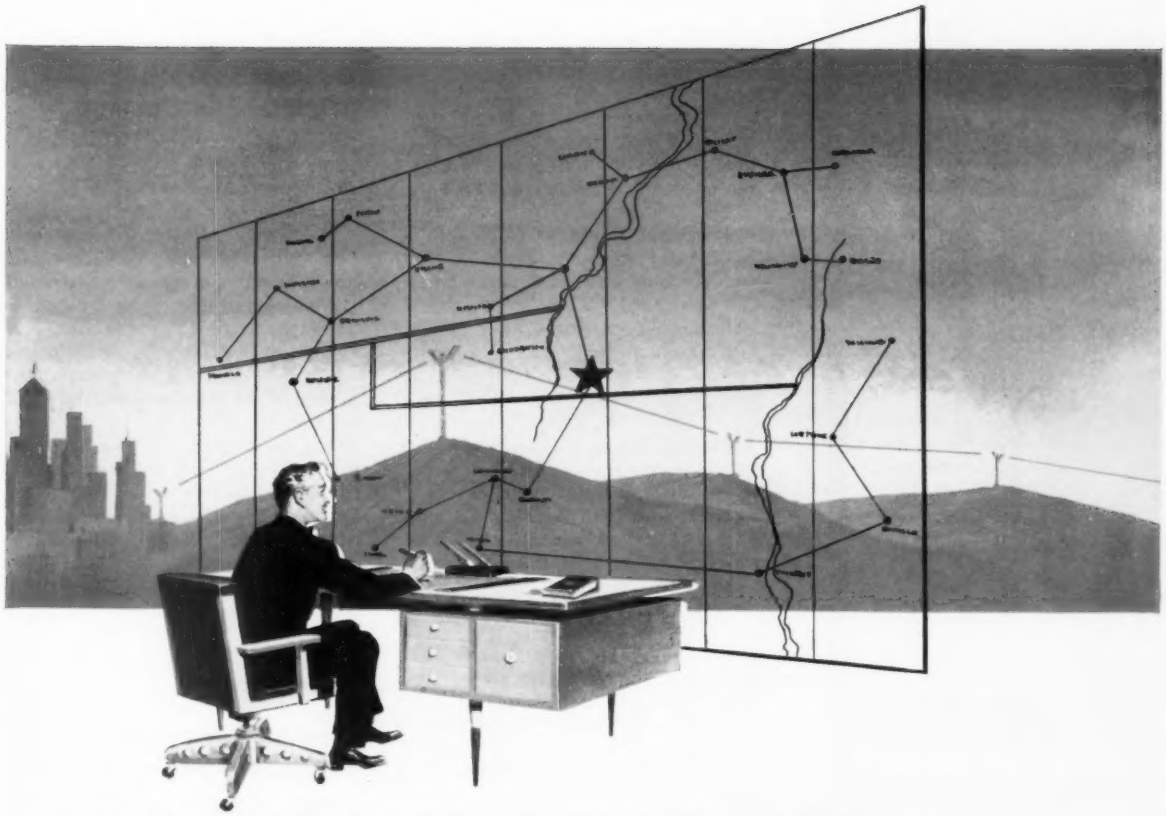
The FPC has authorized Texas Gas Transmission Corp., Owensboro, Ky., to construct and operate new facilities in Louisiana at an estimated cost of $1.5 million (Docket G-10698).

The new facilities include construction of 13 miles of 20-in. line extending from the end of its East Lake Palourde 20-in. line in Assumption parish to the Thibodaux area, Lafourche parish, together with a gas purchase meter station in the Thibodaux area. In October 1956 the FPC granted Texas Gas temporary authorization to construct and operate these facilities.

Underground storage anticipated in Northwest

The Pleasant Valley Oil & Gas Co., a subsidiary of the B. C. Electric Co. Ltd., Vancouver, has announced plans to develop a natural gas underground storage field near Bellingham, Wash.

Development of the storage facility, however, is contingent to the passage of favorable legislation by liability. There are at least nine



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pipeline news • *Cont'd.*

the current Washington legislature. At present, gas companies operating in the state of Washington have no rights of eminent domain. A bill to grant gas companies condemnation rights is expected to be introduced at the current session.

The Bellingham project would have a capacity of 35 to 40 billion cu ft. Announcement of the project was made by Ivar Peterson, a Seattle attorney who represents the Pleasant Valley Oil & Gas Co.

No announcement has been made regarding who will utilize the storage facility, if it is actually put into operation. One possibility would be that B. C. Electric would use it to store gas from the soon-to-be-finished Westcoast Transmission Co. line for peak-shaving purposes. Another possibility is that it would be used by Pacific Northwest Pipeline Corp. for storage, although PNW denies it has any knowledge of this. Yet a third possibility would be that Pleasant Valley would buy gas from either Pacific Northwest or Westcoast and store it, then re-sell it to nearby utilities on peak days.

Gas officials in the Northwest say that it would take a minimum of $2 million, and probably a lot more, to develop the storage field.

General Telephone labs organized in Chicago

General Telephone Corp. has announced formation of General Telephone Laboratories Inc., headquartering in Chicago.

The newly created organization has acquired the research and development personnel and facilities of Automatic Electric Co., principal manufacturing unit of the General Telephone System, and will embark on a greatly expanded program of basic research and product development in the telephone switching and related communications fields. The work of the new laboratories will also extend into all areas of remote control by electronic and electromechanical means.

Robert M. Wopat, Automatic Electric's vice president in charge of research and engineering, has been elected president of the new organization.

Pipeline equipment distributor organized

N. E. Cott has announced formation of Falcon Line Products Corp., which will offer a complete line of materials and equipment to the pipeline industry. The newly organized company will headquarter in Pittsburgh.

The nationally operating company will offer pipeline felts and outer wraps, fiberglass inner wrap and hand-wrap materials, pipe shield, pipeline tapes, field jointers, insulating spacers and seals, holiday detectors, pipeline pigs, anodes and cathodic connections, line travel equipment and other supplies.

Mr. Cott is a veteran in the construction field, having been active with the NACE, Pipeline Contractors Associations, and the New England Gas Association. Prior to forming Falcon Line Products, he was northeastern division manager for Midwestern Pipeline Products Co., Tulsa.

N. E. COTT

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Very truly yours,

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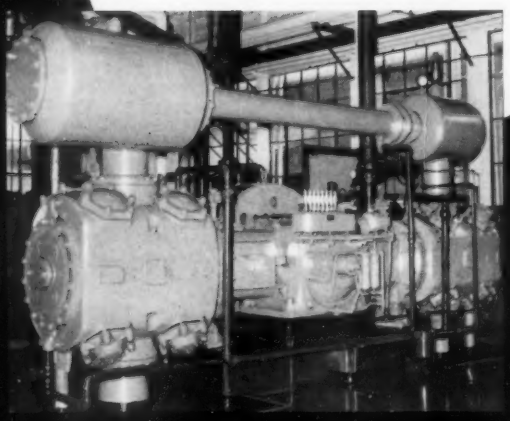

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GAS progress reports

CURRENT CONSTRUCTION

ALBERTA GAS TRUNK LINE CO. LTD., to build 550-mile gathering line in Alberta. 1956 construction consisted of Red Deer river crossing near Bindloss.

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-2121-(1956 program) 239 miles of 22-in. line from Laramie, Wyo. to connection with Pacific Northwest Pipeline Corp. line at Green River, Wyo. R. H. Fulton will start two spreads April 15. Nov. 1 completion schedule delayed due to late pipe delivery.

EL PASO (TEXAS) NATURAL GAS CO. Docket G-10481 to install 28.1 miles of 10¾-in. line in Nolan and Coke Counties, Texas; install new 1320-hp compressor station at Jameson. Line completed. Work underway on compressor.

EL PASO (TEXAS) NATURAL GAS CO. Docket G-8940. To build 338-mile, 34-in. loop line from San Juan basin to a point on California - Arizona border near Topock, Ariz., to increase supplies to existing customers. Completion scheduled for April.

MICHIGAN WISCONSIN PIPE LINE CO., Detroit. Docket G-2327 15.5 miles of 4- and 6-in. line to Three Rivers, Mich. under construction; 25 miles of 24-in. in Wisconsin and 18.5 miles of 4-in. in Iowa, Illinois, Wisconsin and Michigan authorized and scheduled for completion this year. All other construction under this docket has been completed and is in operation.

MONTANA-DAKOTA UTILITIES CO., Minneapolis. Docket G-10521. Remaining compressors (two 540-hp at Baker, Mont.) scheduled for installation next summer.

MOUNTAIN FUEL SUPPLY CO., Salt Lake City. Dockets G-10426 and 10446. To build 38 miles of 20-in line and compressors to transport from Sweetwater county in southern Wyoming 60 MMcf/day purchased from Pacific Northwest Pipeline Corp. Also 2640 hp addition at existing compressor station. 5 miles line and compressors completed. Balance pending.

NORTHERN NATURAL GAS CO., Omaha. Dockets G-2399, et al, for 654 miles of line and an additional 12,640 hp in compressor capacity. Also 15-mile 24-in. line from Ogden, Iowa to underground storage near Redfield; 168-mile 20-in. from Twin City area to Duluth and Superior; 92-mile 12-in. and 71-mile 10-in. line in South Dakota and 307 mile of branch lines. Compressor additions and 15-mile line to test Redfield storage project approved. Contracts for compressors and line let to H. B. Zachary, Dresser Engineering Co., Foor Engineering Co., R. H. Fulton & Co., and Pentzien Inc. Newly approved portion includes a total of 354 miles of line and 18,640 hp in compressor capacity broken down as follows: 163-miles extension from Sioux Falls, S. D. area to Aberdeen, S. D. plus 160 miles of branch lines in South Dakota. Not approved is the Duluth-Superior extension.

PACIFIC GAS & ELECTRIC CO., San Francisco. For 83-mile 20-, 18-, and 16-in. line from Beehive Bend field near Willows, Calif., to a point near Davis and then east into Sacramento.

PACIFIC GAS & ELECTRIC CO., San Francisco. Midwestern-Johnson-Dixon at work on 85-mile, 34-in. line paralleling Super Inch from Topock, Ariz. to Milpitas, Calif. Other contractors at work on 6620-hp additions at Topock and Kettleman compressors.

PERMIAN BASIN PIPELINE Co., Omaha. Dockets G-9688 and 9724. For 19-mile, 16-in. line and 6750-hp compressor station in Andrews county, Texas, to take gas from Phillips gasoline plant. Gasoline Plant Construction Corp. Houston building compressor station; R. H. Fulton the line.

SOUTHERN CALIFORNIA and SOUTHERN COUNTIES GAS CO., Los Angeles. To build 236-mile, 30-in. line from Newhall, Calif. to Topock, Ariz. on Colorado river to meet El Paso Natural line from San Juan and Permian basins. Also three 1760-hp compressors at Topock. R. H. Fulton & Co., Lubbock, Texas, has contract for line. Initial work to begin this month. Scheduled for completion in June, 1957.

TEXAS GAS TRANSMISSION CORP., Owensboro, Ky. Dockets G-8828, 10062, 10395, and 10698, to lay approximately 240 miles of line along its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Illinois and to add 31,510 hp. Work completed on 176 miles of line; compressor construction approximately 85 per cent complete. Completion of pipe work expected about Dec. 20; compressor work prior to Jan. 1. Pipeline construction contractors: Houston Contracting, Williams Bros., Union Construction, Pentzien Inc., Modern Welding, and Ashy Construction. Compressor contractors: Longview Equipment and Ford, Bacon & Davis.

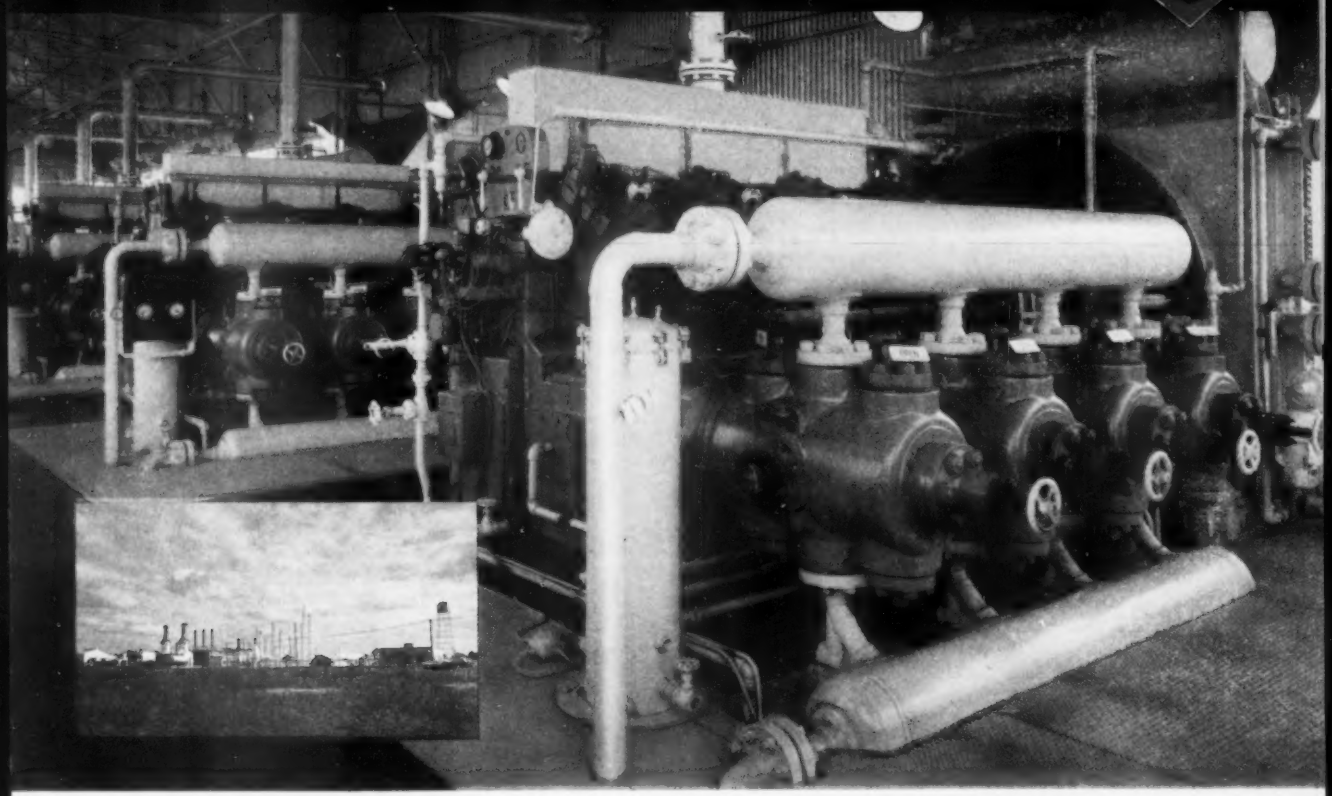
TEXAS EASTERN TRANSMISSION CORP., Shreveport. Dockets G-2503, 9784-87. 422 miles of 30-in. line near Mexican border to transport gas to Texas Eastern's Vidor, Texas station; approximately 45 miles of 24-in. pipe connecting TET's existing line near Provident City, Texas, to the new line; pipeline loops totaling about 77 miles at various locations along existing 30-in. system; approximately 147 miles of supply and sales laterals; new and additional compression facilities totaling 32,250 hp; and approximately 20 sales measuring and regulating stations.

TRANS-CANADA PIPE LINES LTD., for 2287-mile gas line taking Alberta gas from Alberta - Saskatchewan border to Toronto and Montreal, with lateral from Winnipeg to Emerson, Man., 34-in. line from Alberta border to Winnipeg under construction. 30-in. from Winnipeg to Toronto; 24- and 20-in. from Toronto to Montreal; 24-in. from Winnipeg to Emerson; 10 compressor stations totaling 105,000 hp. First four sections of line under contract to Majestic Contractors Ltd., Mannix Ltd., Canadian Bechtel Ltd., and Dutton-Williams Brothers. By November, 230 miles of 34-in. had been ditched.

WASHINGTON (D.C.) GAS LIGHT CO. Docket G-10090 for 26.1-mile, 24-in. line from Dranesville, Va. to a point near Washington. Work nearly completed.

WESTCOAST TRANSMISSION CO. LTD., Calgary. To build 650-mile, 30-in. line from Peace river area to near Vancouver, B. C., to connect with line of Pacific Northwest Pipeline Corp., to transport 400 MMcf daily, of which 300 MMcf is to be delivered to PNW. 400 miles of line installed and ready for testing. Scheduled for completion in fall of 1957.

BEAIRD-INGERSOLL-RAND Packaged Compressor Plant



Arkansas Fuel Oil Corporation's Panola Gasoline plant equipped with three Beaird-Ingersoll-Rand 220 h.p. 8JVG packaged compressors. Units have Young radiators with lubricating oil coolers and gas after-coolers and all necessary controls for unattended operation. Other sizes 110 to 660 h.p.

Packaged Compressors provide—

FLEXIBLE OPERATION FOR LARGE GASOLINE PLANT

Arkansas Fuel Oil Corporation operates this large gasoline plant in the Panola Field just south of Carthage, Texas. Natural gas processed in the plant is picked up from 18 wells by three Beaird-Ingersoll-Rand 8JVG 220 h.p. packaged compressor units. Boosting 8 to 12 million cubic feet per day the units use one stage of compression to raise the gas from 550 psig input to 1100 psig.

To assure maximum flexibility and continuous operation, Arkansas Fuel Oil installed a number of packaged units rather than one large compressor of equal horsepower. Plant pressures and operations can be maintained, when necessary, by two of the units while the third is shut down for maintenance or repair. This permits plant production to be held to scheduled capacity at all times.

As wellhead pressures drop off the compressors can be changed on location to two-stage operation or additional units can be placed on the line. The operating flexibility of this multiple unit packaged compressor station will prove even more valuable as the field approaches depletion. When no longer needed the compressors can be transferred to other service as complete units with little or no change.

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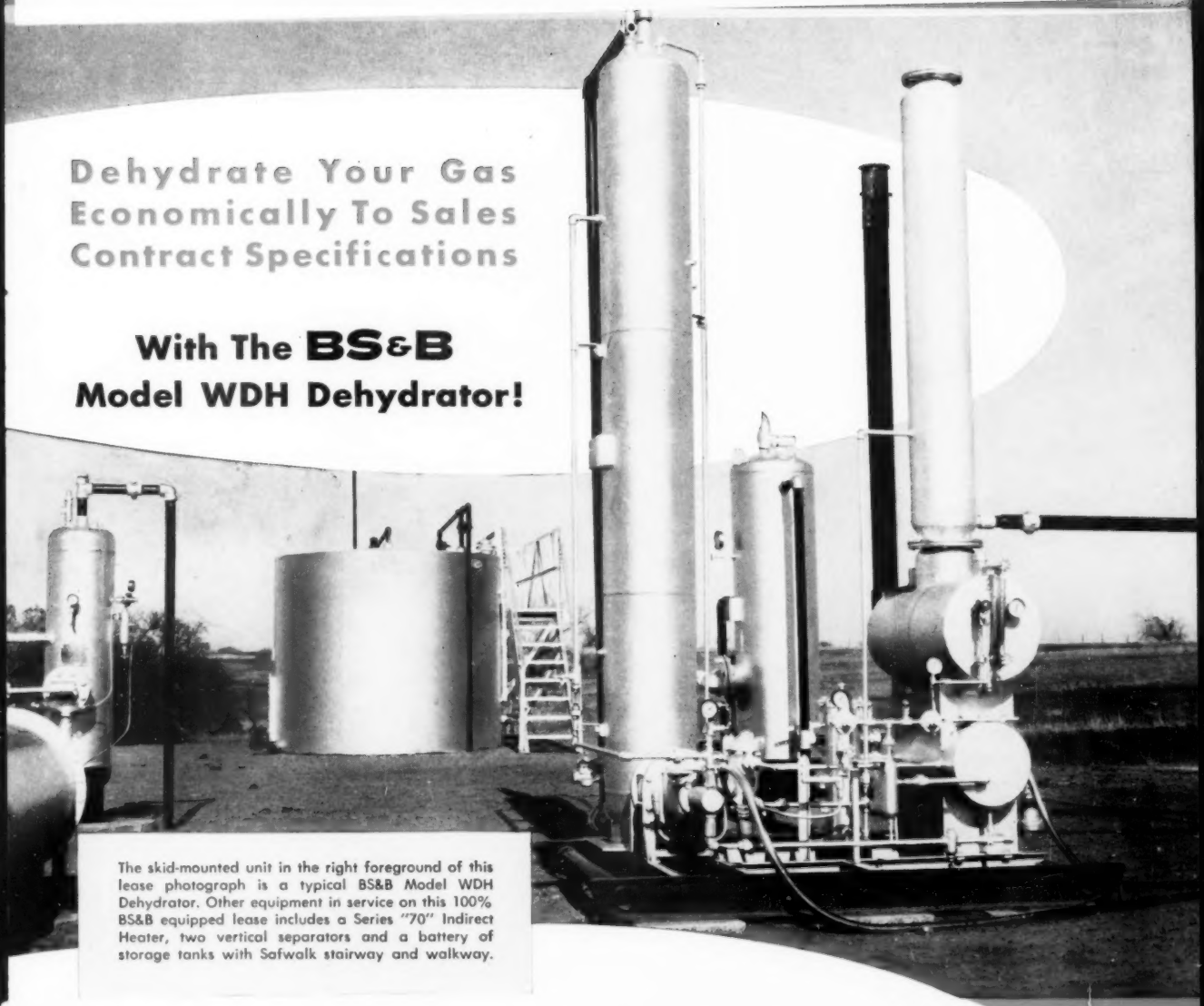

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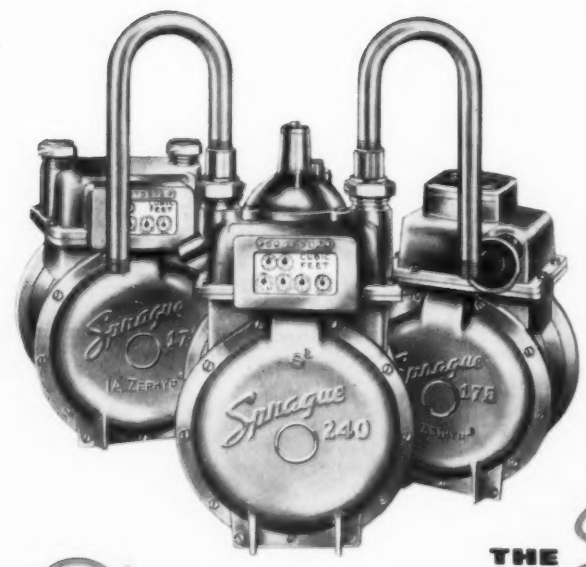

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